SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

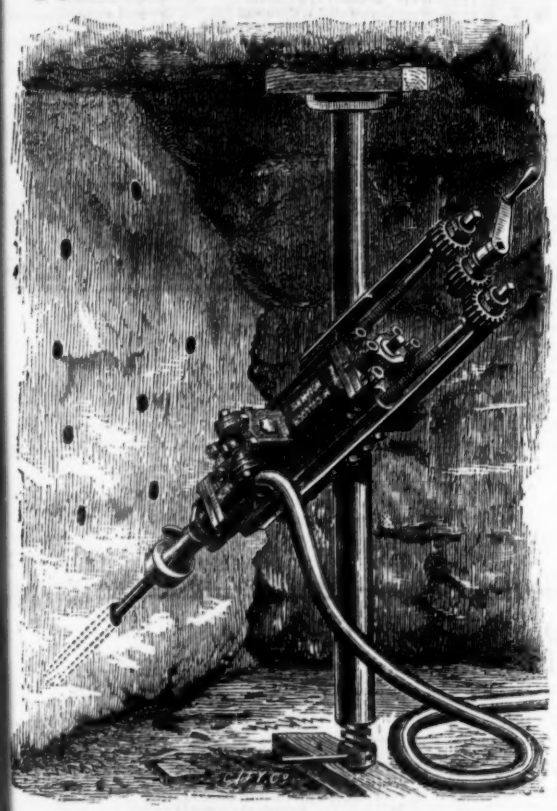
No. 2546.—VOL. LIV. LONDON, SATURDAY, JUNE 7, 1884. PRICE (WITH THE JOURNAL) SIXPENCE BY POST £1 4s. PER ANNUM.

FIRST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC —Highest Award for Effectiveness in Boring, and Economy in the Consumption of Air

JUBILEE EXHIBITION, 1882.

THE PATENT

"CORNISH" ROCK DRILL.



This Drill has been constructed after a long practical experience in the requirements necessary for Mines, and has more than realised the expectations of its inventors. The chief objects in view were GREATER DURABILITY AND LESS LIABILITY TO DISARRANGEMENT; but it has also proved itself more EFFECTIVE AND ECONOMICAL.

We are now prepared to enter into any reasonable arrangement so as to enable users to judge of its merits, as we are thoroughly convinced that we can offer the BEST ROCK DRILL IN THE MARKET.

Further particulars on application to the Makers—

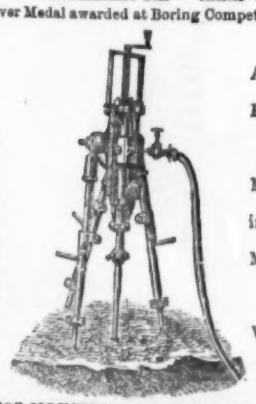
HOLMAN BROTHERS,
CAMBORNE FOUNDRY AND ENGINE WORKS,
CAMBORNE, CORNWALL.

THE PATENT

"ECLIPSE" ROCK-DRILL AND "RELIANCE AIR-COMPRESSOR."

First Silver Medal awarded at Boring Competition, East Pool Mine, Sept. 1883.

SILVER MEDEL—PARIS, 1878—HIGHEST AWARD



Are NOW SUPPLIED to the ENGLISH, FOREIGN, and COLONIAL GOVERNMENTS, and are also IN USE in a number of the largest MINES, RAILWAYS, QUARRIES, and HARBOUR WORKS in GREAT BRITAIN and ABROAD.

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ENGINE DIVIDER TO THE TRADE.

ADDRESS—GREAT TURNSTILE, HOLBORN, LONDON, W.C.

PATENT IMPROVED

"INGERSOLL ROCK DRILL."

MEDALS AND HIGHEST AWARDS

SEVEN YEARS IN SUCCESSION,

FOUR IN ONE YEAR.

American Institute, 1872.
American Institute, 1873.
London International Exhibition, 1874.
Manchester Scientific Society, 1875.
Leeds Exhibition, 1875.
Royal Cornwall Polytechnic, 1875.
Rio de Janeiro Exhibition, 1875.
Australia Brisbane Exhibition, 1876.
Philadelphia Exhibition, 1876.
Royal Cornwall Polytechnic, 1877.
Mining Institute of Cornwall, 1877.
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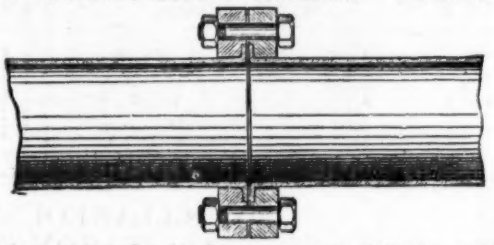
AWARDED FOR

SIMPLICITY in CONSTRUCTION.
AUTOMATIC FEED
(Perfect success)
GREAT STEADINESS.
GREAT POWER.
GREAT DURABILITY.
GREAT EFFECTIVENESS.

WROUGHT-IRON STEAM TUBES.



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Stone Breakers and Grinding Machinery.

CAUTION TO PURCHASERS.

Do not buy any Stone Breaker or Pulverising Machines until you have seen ours. Price Lists and Testimonials free on application.

A Machine as will break 40 tons per day for **£45**.

MACHINES LET OUT ON HIRE, OR ON THE HIRE SYSTEM.

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STONE MACHINE WORKS, LEICESTER, ENGLAND.

MACHINES MADE WITH SECTIONAL FACED JAWS, OR ANY OTHER.

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HAND AND POWER.

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LONDON, E.C.

AIR COMPRESSORS,

With R. SCHRAM'S Patent

Inlet and Outlet Valves.

BOILERS, TURBINES.

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ROCK DRILL.

1600 in Use in all Parts of the World.

Complete Rock Boring Plants of the most approved construction for Railway Tunnels, Quarries, Shaft Sinking, Level Driving, Stoping, and Submarine Blasting.

All Kinds of Mining Machinery.

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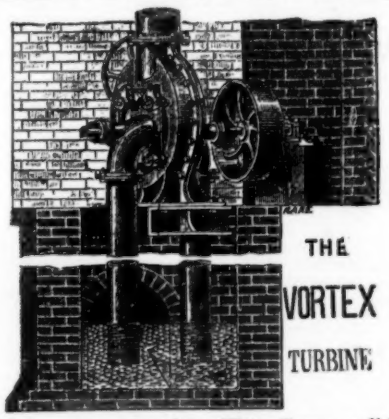


THE VORTEX TURBINE

A most efficient means of applying Water Power to all kinds of Machinery.

Largely used in DRIVING AIR COMPRESSORS, PUMPING WORKING ORE-CRUSHING MACHINERY, and for other purposes in connection with MINING.

Successfully used in ELECTRIC LIGHTING, and in utilising DISTANT WATER POWER by means of ELECTRICITY.

A Pamphlet containing a full description of the Vortex, with several Illustrations and a number of Testimonials, can be obtained on application.

"THE PATENT ACCESSIBLE"

CENTRIFUGAL PUMP

Is the only Pump from which the disc can be removed by breaking the joint on a single face only.

Manufactured by CHARLES L. HETT,
HYDRAULIC ENGINEER,
Maker of
IMPROVED CENTRE VENT,
TURBIN
WATER WHEELS,
Horse, Steam and Wind Power
PUMPS.

Catalogues on Application.

ANCHOLME FOUNDRY, BRIGG, ENGLAND.

BELL'S ASBESTOS.

BELL'S PATENT ASBESTOS BLOCK PACKING, for High Pressure Engines. This Packing has been specially designed to overcome the difficulties experienced by engineers and others in the practical working of engines of the most modern type of construction. The greatly increased skill and workmanship now obtained in the construction of engines and boilers have led to a rapid increase in the working pressure, the object being the attainment of a high rate of speed combined with economical working, the practical advantage of which, however, cannot be realised unless the Packings are so constructed as to avoid stoppages for the purpose of re-packing the stuffing boxes. It is now a recognised fact that the most perfect heat-resisting material suitable for the purpose of a Packing is Asbestos, but to ensure a successful application of this fibre, great skill is required in manufacture. In this Packing the Asbestos is woven into a stout cloth, and owing to the peculiar way in which it is manipulated, great elasticity is imparted to the Packing. This Packing has met with the most unqualified approval wherever it has been used, and on being taken out after about twelve months, working at 70 lb. pressure, it has been found to be in a perfect state of preservation, and was therefore replaced. The Patent Block Packing is square, as Fig. 1, and Figs. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlaid. An Engineer writes as follows:—"The Asbestos Block Packing works splendidly. I have never seen its equal. We keep our gland nuts so that you can move them with finger and thumb, and can maintain a constant vacuum of 28½ in." As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufactures at my list prices, users are requested to see that the packing supplied to them bears my trade mark.

TRADE MARK.

The goods of this house are of the highest quality only, and no attempt is made to compete with other manufacturers by the supply of inferior materials at low prices. All orders must be sent direct to the undermentioned depots and not through Agents or Factors.

BELL'S ASBESTOS BOILER PRESERVATIVE. This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that 1/16 in. thick of incrustation causes a waste of 15 per cent. of coal; ⅛ in., 60 per cent.; ¼ in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler and covers its own cost a hundred-fold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING

for Locomotives, and all Stationary Engines running at very high speed with intense friction.

The following Testimonial refers to this Packing:—

Festiniog Railway, Locomotive Superintendent's Office,
Portmadoc, January 13, 1883.

Mr. John Bell, 118, Southwark-street, S.E.

DEAR SIR,

I have much pleasure in saying that the Asbestos Yarn and Soapstone Packing gives every satisfaction; indeed, better than we expected. We have a locomotive packed with it, which has been running five months (and think of the piston speed with our small wheels). I think the Soapstone a great improvement, as it keeps the packing elastic, and prevents it getting hard. I am very pleased with its working, and also the very low price for such good lasting Packing. The Asbestos Yarn we find is very useful, and answers admirably.

Yours truly,
(Signed) W. WILLIAMS.

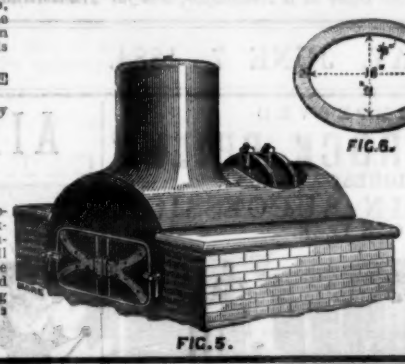


FIG. 5.

FIG. 6.

FIG. 1.

FIG. 2.

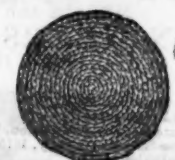


FIG. 4.

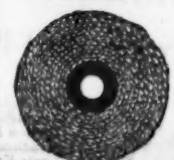


FIG. 3.

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors; also for large "still" joints where boiling fat and steam have to be resisted. It is kept in stock in rolls of 100 ft., from ⅛ in. (Fig. 6) to 3 in. wide, and any thickness from 1/16 in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and ½ millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

BELL'S ASBESTOS EXPANSION SHEETING (PATENT).

This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials.

The India-rubber Washer is protected from the action of heat and grease by an outer coating of vulcanised Asbestos Cloth, thus producing an excellent joint where expansion and contraction render other materials unserviceable.

This material is admirably suited to steam pipe joints and every class of valve.

Valves made of this material are very durable, as they are not subject to injury by oil.

BELL'S "ASBESTOS LUBRICANT."

ILLUSTRATED PRICED CATALOGUE FREE ON APPLICATION TO

BELL'S ASBESTOS WORKS, SOUTHWARK, LONDON, S. E.

OR THE DEPOTS—118a, SOUTHWARK STREET, S.E.,

Victoria Buildings, Deansgate, MANCHESTER. 11 and 13, St. Vincent Place, GLASGOW. 39, Mount Stuart Square, CARDIFF. 21, Ritter Strasse, BERLIN.

R. S. NEWALL AND CO.,

Sole Patentees of Untwisted Wire Rope.

Iron & Steel Ropes of the highest quality for Collieries, Railways, Suspension Bridges, &c.

PATENT STEEL FLEXIBLE ROPES AND HAWSERS.

IRON STEEL, AND COPPER CORDS. LIGHTNING CONDUCTORS.

COPPER CABLES of high Conductivity for Electric Light and Power.

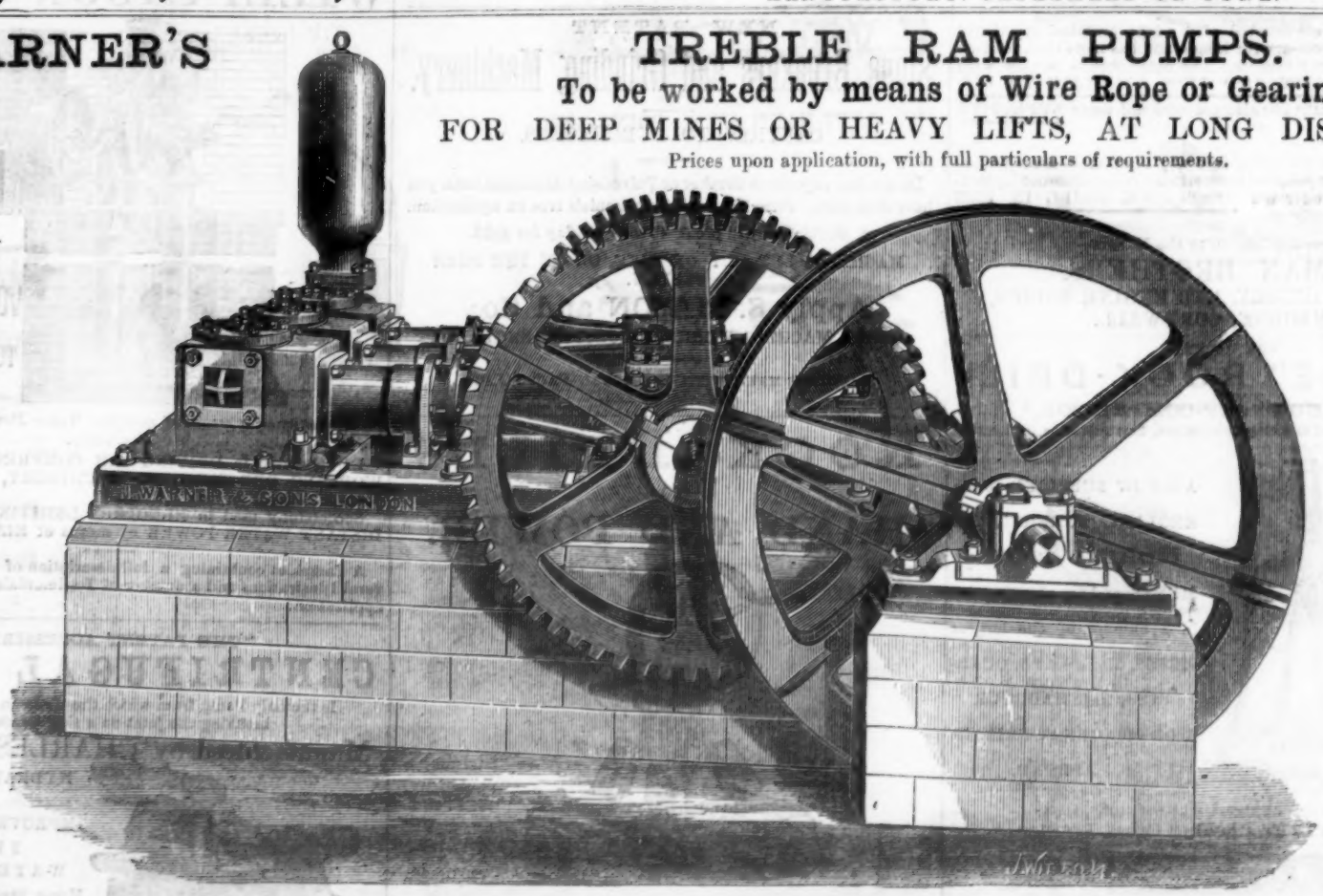
London: 130, STRAND, W.C. Liverpool: 7, NEW QUAY.
Glasgow: 68, ANDERSTON QUAY.
MANUFACTORY: GATESHEAD-ON-TYNE.

WARNER'S TREBLE RAM PUMPS.

To be worked by means of Wire Rope or Gearing.

FOR DEEP MINES OR HEAVY LIFTS, AT LONG DISTANCES.

Prices upon application, with full particulars of requirements.



As supplied to Messrs BOWES, of Springwell Colliery, Gateshead, for a Lift of (600) Six hundred feet vertical through two miles of pipes.

JOHN WARNER AND SONS, THE CRESCENT FOUNDRY, CRIPPLEGATE, LONDON, E.C.

R. HUDSON'S

Patent Steel Trucks, Points and Crossings,

PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

Telephone No. 14.
In connection with the Leeds Exchange, and all the principal Hotels and places of business in the town.

GILDERSOME FOUNDRY, NEAR LEEDS.

(Near Gildersome Station, G.N.R. Main Line, Bradford to Wakefield and London, via Laisterdyke and Ardsley Junctions.)

Registered Telegraphic Address:—"GILDERSOME, LEEDS."
A. B. C. Code used.

UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the LIGHTEST, STRONGEST, and most CAPACIOUS made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

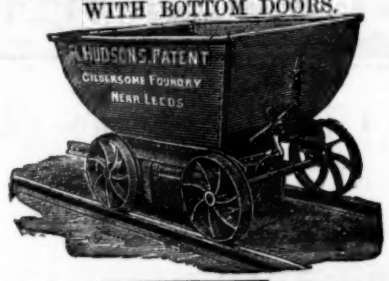
Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.
N.B.—The American, Australian, Indian, and Spanish Patents on Sale.

CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

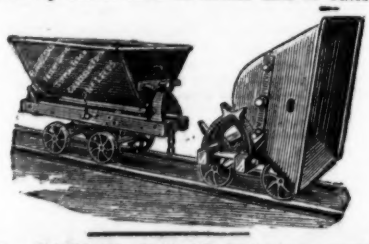
1.—PATENT STEEL END TIP WAGONS.

7.—PATENT STEEL MINING WAGONS.

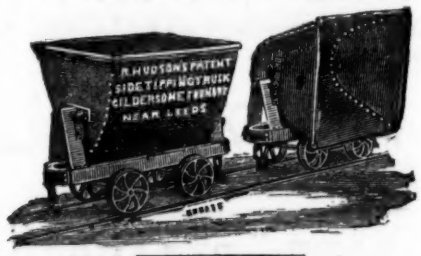
12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.



2. PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK,
Will tip either SIDE or either END of rails.



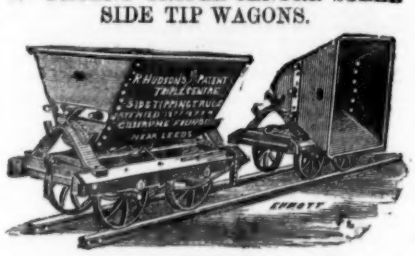
8.—PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS,
Will tip either side of Wagons.



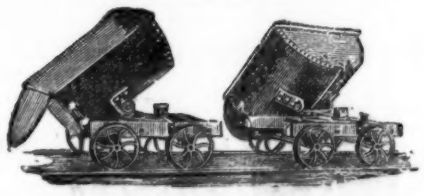
13.—PATENT STEEL HOPPER WAGON.

ONE man can EASILY tip ANY WEIGHT in these wagons.

3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.

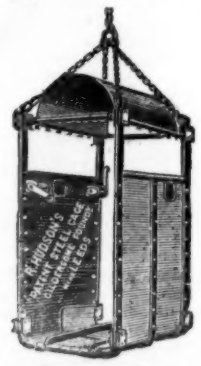


9.—PATENT STEEL ALL-ROUND TIP WAGON.



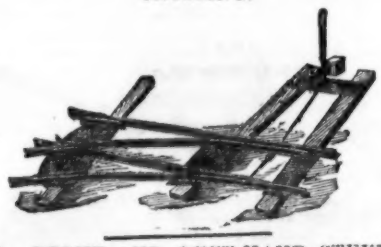
14.—SELF-RIGHTING STEEL TIP BUCKET.
(The "CATCH" can also be made SELF-ACTING if desired.)

15.—STEEL CAGE.

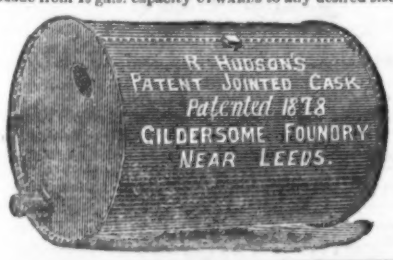


4. -PATENT STEEL PLATFORM OR SUGAR CANE WAGON.

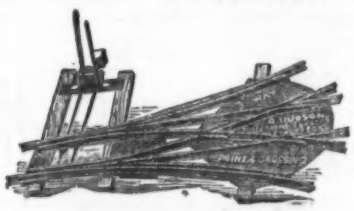
10.—LEFT-HAND STEEL POINT AND CROSSING.



5.—PATENT STEEL CASK.
As supplied to H.M. War Office for the late war in Egypt).
DOUBLE the STRENGTH of ordinary Casks without any INCREASE in weight.
(Made from 10 gals. capacity UPWARDS to any desired size.)



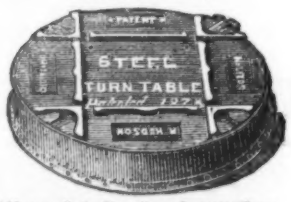
11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.



16.—PATENT STEEL WHEELBARROWS.
Made to any Size.
Lightest and Strongest in the Market.

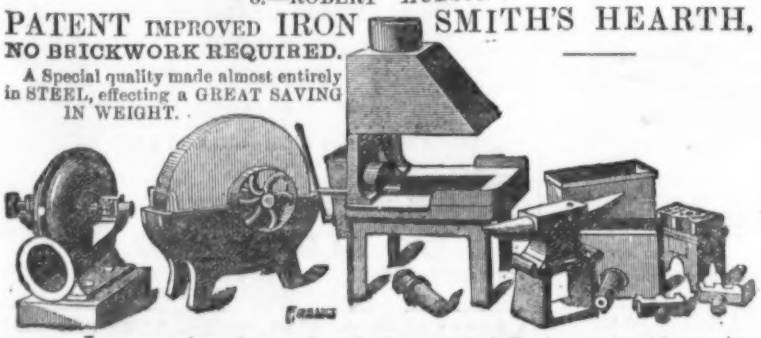
A great success.

17.—STEEL SELF-CONTAINED TURNTABLE.



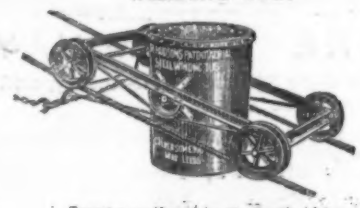
(Also made in CAST Iron for use where weight is not a consideration.

6.—ROBERT HUDSON'S
PATENT IMPROVED IRON & SMITH'S HEARTH,
NO BRICKWORK REQUIRED.
A Special quality made almost entirely in STEEL, effecting a GREAT SAVING IN WEIGHT.



Large numbers in use by all the principal Engineers in this country and abroad.

18.—"AERIAL" STEEL WINDING TUB.



Largely employed in the South African Diamond Fields.

No. 19.—PATENT STEEL CHARGING BARROW,
DOUBLE the STRENGTH & much LIGHTER than ordinary Barrow

ALL KINDS OF BOLTS NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES

Pumping Engines for Mines, Water Works, Sewage Works, and General Purposes.

CATALOGUES ON

PUMPING & MINING MACHINERY.

HATHORN, DAVEY, & Co., LEEDS.

Hydraulic Pumps, Winding Engines, Air Compressors, Man Engines, Capstans, &c., &c.

APPLICATION.

BRAUN AND BLOEM'S

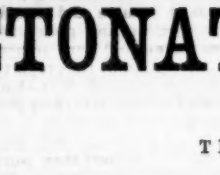
CELEBRATED

DETONATORS—"EAGLE" BRAND.

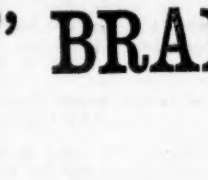
TRADE MARK.

The most powerful Percussion Caps for exploding Dynamite, developing its fullest strength.

PACKED IN THEIR PATENT TIN BOXES.



PATENT No. 3665



A new invention, doing away with the very dangerous operation generally in use of inserting cutting tools when it is necessary to open the outer tin box.

Sold by WM. BRODERSEN, 79, Leadenhall-street, London, E.C.

SOLE AGENT FOR THE UNITED KINGDOM AND THE COLONIES.

DEUTSCHE SPRENGSTOFF ACT.-GES.

TRADE MARK.

(GERMAN EXPLOSIVES COMPANY, LIMITED),

HAMBURG.

DYNAMITE

Of the HIGHEST DESCRIPTION, and of the maximum strength allowed by the British Explosives Act (75 per cent. Nitroglycerine).

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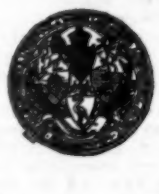
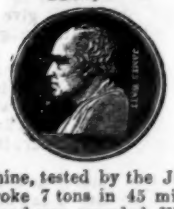


1881.



Our Machine, tested by the Judges at Calcutta, broke 7 tons in 45 minutes to 2½ in. ring, and was awarded First Class Certificate and Gold Medal in competition with the Blake Machine.

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We shall be glad to receive any kind of stone ore or other material to be broken or crushed at Shrewsbury Royal Show, Stand No. 247, in July, either by our Breaker or New Patent Fine Crusher.

We also exhibit at the Highland Show at Edinburgh in July.

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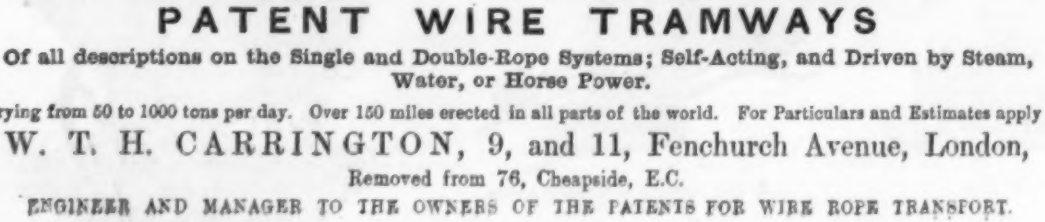

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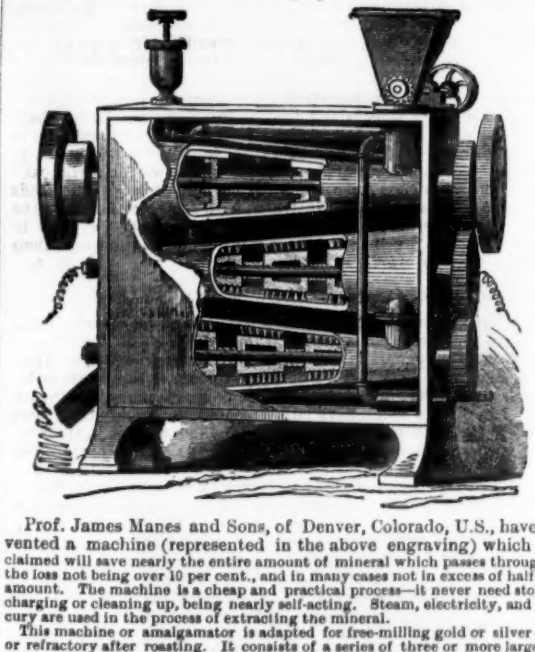
NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in the working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings of stamp mills, or the sands of hydraulic gold diggings, or from the black sands on the coast of Oregon or California, and other parts of the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it is claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never need stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel mullers which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamic electro machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used if found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought in contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes will be caught in syphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are—

1.—The saving of almost all the mineral passing through the machine.

2.—The loss being less than 10 per cent.

3.—The entire absence of loss of the amalgamated material, thereby saving all the mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.

4.—The small cost per ton at which the ore can be treated.

By the addition of the powerful current of electricity that passes off the revolving brushes, the most minute particles of gold will be caught and retained, which in the ordinary flume and stamps passes off with the water; this often amounts to a large percentage.

The inventors state that if English stock companies will give their assistance to work the black sands of Oregon and California by paying for the building of the machines, they will take a share of the gold for their services, or they will send their machines to any part of the world, or will sell patent rights to those desiring any of their patent machines or revolving furnaces for roasting or smelting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Sparey Ball Pulveriser, that crushes and pulverises at the same time, and does as much work as eight stamps in a day, crushing either wet or dry.

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Original Correspondence.

AUSTRALIAN GOLD MINING.

SIR,—If one tithe of the capital which was so foolishly, recklessly, and ignorantly wasted by English investors in "unknown of" East Indian, and "to well" known of (to the promoters) American gold (?) mines, had been spent with their own countrymen in Queensland, some of them, at least, would have probably had a share in such returns as these.

The Charters Towers Phœbe Company have bottoms on 8 in. of mundic, showing gold at 130 ft. down. The Victory Company crushed 520 tons for 1560 ozs. The Queen prospecting claim cleaned up a crushing of 96 tons for 384 ozs.

The mining manager of the Ellen Harkins Gold Mining Company, Gympie, reports:—"27 bars, weighing 4468 ozs. 18 dwts., extracted from 71 tons of stone, the result of about five weeks' work The stone was all obtained merely in sinking the shaft at about 600 ft. depth. From the above proceeds a dividend of 11s. per share (equal to 14,850*l.*) has been declared. Equally good stone is still showing in the bottom of the shaft."

In connection with the very rich discoveries of gold that have recently been made at Gympie, Queensland, and the great impetus which that field has in consequence received, we are informed that the Queensland National Bank here have just received from their branch there the really splendid remittance of 22,000 ozs. (value, say 80,000*l.*). Of this the Great Wilmot Extended Gold Mining Company (Limited), have, as the result of nine weeks' work, contributed some 11,000 ozs., and the Ellen Harkins Gold Mining Company, from five weeks' work, 4500 ozs. The first named of these two mines has accordingly declared a dividend of 1*l.* per share, amounting to 36,000*l.*, the second named one of 11s. per share, 14,800*l.*, and both mines are reported as looking splendidly. The whole of the 22,000 ozs. of gold referred to above will be on exhibition today in the windows of the Queensland National Bank (Limited), Pit-street.

New South Wales has hundreds of miles of auriferous country unexplored as yet, and Queensland has probably thousands, for there are literally more mines than miners to work them, or than there is spare capital here to carry on the initial work with, and yet England will risk its hundreds of thousands of cash down for "wild cat" ventures in half lawless America, rather than invest a few thousands in civilised and law-abiding Australia, with reefs proved to be the richest in the world, and where owners would take payment in shares so long as reasonable means were found to develope their property.—*Sydney, April.* R. D. A.

SILVER MINING IN NEW SOUTH WALES.

SIR,—The subjoined account of the Barrier Ranges Silver Mining District in this colony may interest many readers of the *Mining Journal*. It is not generally known, says the Melbourne Age, of April 14, that important work is being done by Melbourne capitalists in developing some silver mines located in the Barrier Ranges, New South Wales. The reports which have lately reached us indicate that there is a bright future in store for these mines, which are yet in their infancy. They have been opened about 10 years, but no prospecting worth speaking about was carried on until a few months since. The original prospectors, it seems, had very imperfect knowledge of silver mines, and really did not grasp the importance of their discovery. Want of capital appears also to have been another failing with them. At all events very little work was done on the ground, and the lodes imperfectly tested. Some months ago the value of these lodes was brought under the notice of several well-known Melbourne capitalists, who, after obtaining a report from an expert, thought so highly of the prospect, that they formed themselves into a syndicate, and bought out all the old leaseholders in the district. This syndicate now holds about 1600 acres, and have started work in some of the old shafts, from which not highly encouraging but really astonishing rich prospects have already been secured.

The Barrier Ranges are difficult to reach, owing to the absence of ordinary travelling accommodation, though the road is described as being much better than the average Australian bush track. The Silver Company is reached from Adelaide, partly by means of the train and partly by coach, the coaching journey covering a distance of 190 miles. The country through which the coach passes is purely a saltbush one, and in dry weather natural feed for cattle is scarce. The South Australian Government have provided water tanks or wells on the wayside about every 30 miles. Hitherto a great difficulty has been encountered in the heavy cost of transporting ore from the mines to the railway terminus at Terowie; but as the road is stated to be eminently suited for traction engine work, this mode of transit would considerably reduce the cost of carriage. The new town of Silver City is situated six miles east of the old border township known as Thackaringa. Mr. W. R. Fitzgerald Moore, M.E.C.E., who has fully reported to the Melbourne syndicate upon the silver and argentiferous galena mines in the Barrier Ranges, states that the hills in the vicinity of Silver Town, many miles to the north, slope to the east and west, and descend boldly to the plains of the great depression, which, with a few breaks, stretch to the sea on the west, and for hundreds of miles in an easterly direction, whilst their course of strike is almost in a due north line. They continue without a break until they sink under the great Queensland plains. The average width of the main range proper is, perhaps, about three miles, although no accurate main width can be arrived at because of very unusual variety of form. Numerous creeks take their rise in these hills and cut traversely through the valleys. During the wet season, or rather after a thunderstorm, the drainage which flows from both sides of the range is, as a rule, captured in the large tanks or dams belonging to the great sheep runs in the district. Although in some cases in the middle of these ranges the hills rise to considerable peaks, yet, from geological accidents, their summits deviate to one or the other side, but seldon, if ever, overhang the table-land in precipitous peaks, as the same class of formation to be seen in many parts of the Sierra Nevadas. The valleys are seldom continuous for any great distance, but are divided by spurs of the ranges, which invade them from one side, and by low volcanic groups which push out from the other. From the summit of the highest hills may be seen vast stretches of saltbush country, appearing in the distance like great naked deserts, only varied by beds of saline efflorescence, from whence, in the blazing heat, columns of parched air whirl upwards, laden with acrid dust and drifting sand. It is almost impossible to conceive a prospect of more stern desolation than may be viewed from the crest of these ranges; indeed, the eye is only relieved by threads of green which skert the watercourses,

Over the whole of this great mountain chain are found localities of the precious metals, and following their leading structural idea, they arrange themselves in parallel zones of a similar nature to those of the Cordilleras and California. Approaching the range by the south-west, the great talc schist formations crop out in wonderful profusion. The general strike in this part is about 30 west of north, and it is curious to see immense stretches of well-defined dioritic reefs cutting them at an oblique angle on their course to the north-east. Further to the north the range is composed of crumbled and uplifted strata, varied by immense barren quartz outcrops and gigantic dykes, and also by ancient eruptive rocks, which, no doubt, accompanied the upheaval. Where the section of the formation can be examined there can be seen folds of more or less complexity, twisted and warped by longitudinal forces, and often compressed into a series of zigzags of a wonderful nature. These are a few of the characteristics of the silver-bearing parts of the Barrier Ranges.

Silver-bearing ores were first discovered by a shepherd in the year 1876, whilst out with his mob of sheep on the range. He brought samples of the ore to some of the local magnates, but as their nature was little understood, the treasure lay undisturbed until a Mr. Green raised some of it with the intention of sending it to England; through some mishap in transit no returns ever came to Mr. Green. About 18 months ago, however, another lot of ore was shipped to England to be sold; this time with better results, though, through inexperience, the miners selected the lowest grade ores—argentiferous galena, leaving out the rich sulphides of silver. They netted the handsome return of 7*l.* per ton on the shipment, after the highest commissions and charges had been exacted. Miners who were working silver properties in these parts were all making money before they sold out. There is a great advantage in this class of mining, inasmuch as there is no machinery for the working of these ores necessary beyond the ordinary windlass or horse-whip. The ore is simply put into bags and shipped to England, thus saving all costly smelting and working in this country.

The mines of this district consist of two groups. The one at Silver City embraces 11 claims, in which the ore consists of sulphides of lead or argentiferous galena. The profits secured on these ores amount to 12*l.* per ton. About eight of these mines are opened up, six of them to a considerable extent. There is one shaft down 130 ft., carrying the lode very strong in the bottom. The lode at this point gives indications of turning from sulphides of lead into sulphides of silver. Fifteen shafts have been sunk on different parts of these 11 mines, their depth varying from 30 ft. to 75 ft., one being 135 ft. The lode is disclosed in each of these shafts, and found to be of a thickness varying from 1 ft. to 3 ft. Some rich returns are now being obtained from these mines, the ore yielding, as above stated, a clear profit of 12*l.* per ton.

The second and larger group of mines is situate 28 miles from Silver City. They are called the Lakes Camp group. The ores here are purely sulphides of silver, and very rich. Two tons of ore recently sent to England for assay were sold for 600*l.* Shafts have been sunk in many parts of the ground held by the syndicate, and ore has been discovered everywhere, but of course all of it is not of the richest quality. The shafts vary in depth from 10 to 75 ft. In one put down on a "big bonanza" the lode is found to be of enormous value (300*l.* per ton), and it is said that a great portion of the money paid by the syndicate for the entire ground has already been secured to them in profits from this one shaft. The lodes have all the appearance of permanency. In one shaft, the deepest of this group, the lode had been traced to the total depth—75 ft., and at the bottom it is 6 in. thick, with indications of continuance and improvement. A great drawback to the rapid development of those mines is the scarcity of labour at Silver City. Much anxiety is also caused by the scarcity of water.

From private sources of information also I have every reason to believe that the deposits are likely to prove extensive, so far at least, as mere surface indications can show, but of course the "permanence" mainly depends on the strength of the lodes at a depth, and all that has yet to be really proved.

I see Dr. Robert Fraser is out here again from the old country. He is a "terror" to the mere speculating promoter and bogus minedealer in these colonies, and to us; victims of our own ignorance and the rascality of above gentry in the "fever" of 1870. It is refreshing to see how the "Doctor" turns them round his finger, and expresses their misdoings when they try it on. Whoever his principals are, they at least are well protected by him, and if every mining venture here could only be passed first through the "hands" of such men as he shareholders might expect good returns, and these colonies an equally good mining repute.—*Sydney, April* 17. R. D. A.

DIAMOND MINING IN NEW SOUTH WALES.

SIR,—As it is probable that New South Wales diamond mining will be brought prominently into notice in the immediate future, the subjoined extracts from local authorities will be interesting. The Argus says:—The Bingera diamond fields are attracting considerable attention. A syndicate formed in London is in treaty for a portion of the ground at a very high figure. Now that water has been obtained by boring other parties intend to commence diamond mining. The result of the Australian Company's next washing, which will take place within two months, is awaited with interest. The diamonds increase in size and number as the wash is followed down.

Diamond mining, says another authority, has passed away, but not into oblivion or for all time. It was but a phœnix death after all, from which has been reserved for one man the pride and good fortune of awakening it to new life, and what promises to be a future of permanent and hitherto unimagined prosperity. When all else had "given the diamond fields best," a certain Mr. Charles Rogers still continued hoping against hope. For some years he kept men "prospecting" the ground in search of a payable find, but with no satisfactory results. At last, a little more than two years ago, he determined to "buckle to" himself in downright earnest. He went out and camped on the ground itself, leading there a solitary life of hardship and privation, and passing weeks at a time without seeing a white man's face; digging and washing up and down the ground, and often carrying the wash-dirt on his back two miles to water, until, at last, after 18 months of this unenviable existence, he struck the right patch, and unearthed gems of a size and in numbers sufficient for his purpose. Accordingly, in August last, he dispatched an agent to Melbourne with the stones. The result was their being submitted for inspection by Mr. N. Barnet, a Melbourne architect, to Messrs. Falk and Co., the well-known diamond merchants of that city, who pronounced them to be genuine diamonds and of excellent water. Further investigation and enquiry took place, speculative heads were put together, and speculative ideas interchanged between them, and Mr. Philip Falk and Mr. Barnet were posted off haste-post-haste to examine personally the site of the discovery. The result is known to all. These gentlemen obtained 75 diamonds from a washing, a syndicate was formed, under the title of the Australian Diamond Mining Company, and 80 acres of ground were purchased from Mr. Rogers for the sum of 3500*l.* Almost immediately after the purchase of the ground, the company were fortunate enough to secure for the management of their new enterprise the services of Mr. C. J. Barnes. This gentleman was a new arrival in these colonies from the Cape, where he had spent ten years on the Kimberley diamond mines, managing various companies there. Had they searched the world over they could hardly have pitched upon a more suitable man to entrust the conduct of their Bingera mines to, and to Mr. Barnes' practical experience and ability must be largely attributed the success of the company hitherto, and whatever future prosperity is in store for them. Mr. Barnes' first step was to erect suitable machinery on the river bank at its nearest point to the diamond field, three miles distant. It was completed under his own superintendence, and "christened" by a daughter of Mr. Brougham, police magistrate at Bingera, before a numerous assemblage and with much ceremony on the 1st of November last, by the name of "Philip"—this one being chosen out of compliment to Mr. Philip Falk, the local representative of the company.

The following extracts from a report issued by Mr. Barnes shortly after this may be appropriately given here, before I describe the machinery in detail:—

On inspecting the property I found an open cutting about 40 by 60 ft. showing an open space of about 11 ft., the surface of which was covered with a heavy wash; under this wash there is a layer of red sand about 2 ft. thick; this layer then changes to one of a limy character, with veins of washdirt intermixed, this layer being about 3 ft. deep; underneath this is found the diamondiferous wash, being exceedingly hard, but, after being exposed to the atmosphere for a short time, it pulverises similarly to the blue ground of the African diamond fields. This ground when so treated and washed I have proved to contain diamonds in large numbers; the diamonds so obtained, for the most part, are small, but I firmly believe that as we work further into the wash very much larger stones will be found. In proof of which I may state that during my ten years' experience on the diamond fields of Africa, where I have worked in four different mines, as well as the river diggings, in no case have I known small stones to be found without being accompanied by larger ones, and, therefore, I have every confidence in asserting that this must become a very valuable property. On seeing the nature of the ground I erected a machine something similar to that known in Africa as a Bevel-bottomed Machine. It has now been working one week, and, from the clayey nature of the ground, I can see that to wash a large quantity it will need another similar machine to puddle the ground previous to entering the present one. With this exception, it works satisfactorily. I must here state that this week's washing was purely a test, because about two-thirds of the ground washed was the soil overlaying the diamond wash, beside which a large amount of top soil became mixed accidently with the wash, and as I had to make room for the carts to enter the cutting, the carters mixed up the ground; therefore I may safely say that during only three days of the present week I washed diamondiferous wash-dirt, the balance being top dirt. Taking this into consideration, and also having to drive the machine by horse power, which is very irregular, I consider the result very satisfactory. N. B.

Melbourne, April 12.

CALIFORNIAN MINES, AND ENGLISH CAPITALISTS.

SIR,—Through a friend now managing a large placer (drifting) mine in California, I am enabled to offer to capitalists the opportunity to get 20 per cent. per annum, payable quarterly, on $200,000 for two years, with the privilege of renewal if wished by the borrower at the end of that time for one year more, the security in the case being perfect. I would prefer if I can to interest English capital for the reason that I would like to make a name and reputation there, as being well posted in mining properties, and giving to those who may interest themselves with me large and sure returns for their confidence. I will give a brief description of the property on which he wishes the money. There are 1500 acres of drift channel, being over two miles in length, embraced within the lines of the United States patent covering the property.

The ownership at the commencement was divided into 36 shares, the shares all being taken by practical miners then working in the neighbouring mines. Since the tunnel encountered gravel in the year 1876 the dividends have never been omitted for a single month. The mine is opened by a tunnel cut in the bedrock 6 ft. high and 5½ ft. wide; 3000 ft. in length will be laid with T-rails. Three blocks of gravel 3000 ft. long by 350 ft. wide have been extracted, and the miners have worked out about half each of two blocks of like size, and are now extracting gravel from the remainder of these two blocks. In advance of this point, where the miners are now engaged, opened by the tunnel and gangways therefrom, are exposed ready for extraction three blocks of gravel of the same dimensions as above noted. The gravel exposed in the latter blocks prospects as well as that heretofore mined, and will, without question, present handsome returns. A careful estimate would show a value of $250,000 contained in each of these blocks, or a total of $750,000, 50 per cent. of which sum, or $375,000, would be profit. The gravel averages very uniformly, is free from cement, washes readily, and the gold is coarse; valued at $18 to the ounce at the United States Mint. The mine has averaged $74·25 profit monthly from each miner employed, for a long period past, including all dead work, and this figure can be realised in the future. By lengthening the present face of the drift 300 miners and more could be placed in the mine at the same ratio of profit, or from $22,000 to $38,000 per month, so long as the mine is worked upon a systematic method. By putting such a force at work the three blocks now exposed could be removed in two years. The office of the company, the blacksmith's shop, and the tool and dump-house are all in good repair, also ample cars and tools. The water rights of the company furnish ample water to wash the gravel as fast as run from the tunnel, and with that drained from the mine would wash three times the present product. The books have been thoroughly kept, showing the items of expense properly segregated from the time of commencement of work to date. The United States Mint receipts are on file for all gold extracted, authenticating the sale or product to the present time, as also the receipts of the shareholders for their various dividends.

The principal owner, who has 20 shares of the 36 previously mentioned, wishes to get the remaining shares, but has not enough by the sum he wishes to borrow. He proposes to deed outright to a trustee, or to the parties themselves, a controlling interest in the mine, with an agreement back that in case he pays the interest and principal sum, as stated, he should have a deed back. Also that what is taken from those three blocks, after deducting the simple working expenses, he getting no part of it either in the way of salary or dividend, shall all be deposited in some San Francisco bank to the credit of the trustee or of the parties themselves, until the debt is wiped out. They are also to have their own man at the mine to see that the work is done as agreed, to whom he will pay not over $200 per month. But he is not to interfere in the management so long as the contract is not broken in any way. He will also pay the expenses of any one who may be sent to make examination, provided the loan is made, or the property is not as represented. In brief it amounts to this:—

There is now sufficient gold-bearing gravel in sight and ready for extraction to net over $350,000. With proper management this can be taken out in two years. This is a certainty. The mine is certain to produce this if it never afterwards yields a cent. This advantage he proposes to give to those investing. He, of course, feels confident that he can keep up the production afterwards. But this is only a probability. The $350,000 is sure, and there can be no failure here. If parties can be got who will take it at 15 per cent. of course 5 per cent. a year can be made. I had thought of doing it in this way if I make the attempt here. But for the reason given I would prefer to have English parties interest themselves in it, and so will let the whole 20 per cent. go to them. After this indebtedness is paid $25,000 will be paid from the first earnings of the mine as a commission. Of this I will give up $20,000 to whoever assist me in the matter, and would rather give up the whole than not have it go through.

The present uncertainty in regard to hydraulic mines has rendered drifting mines much more valuable, and should be taken into account in deciding on this proposition. I am fully aware how strange, and perhaps foolish, such a proposition may seem to you at first thought, and it is only because I know just how good and sure it is that I have dared to write as I have.

I shall make nothing except in the future, and I look for my reward in the reputation this will give me. I can only ask you to give it thoughtful consideration, and to do what you can, remembering that steps must be taken at once to secure it. If successful it will never be regretted. I subjoin a few items in regard to drift mining, not that I think they are new to your readers, but hoping they may prove useful in this matter.

One other matter I would like to ask about. I hope soon to have some samples of a decomposed porphyry, assaying well in gold, from $20 to $2000 a ton, I am told. There is an inexhaustible quantity of it, and thousands of dollars have been spent on it, but so far without success. It is very fine, almost flower gold, and there seems to be some oily substance that prevents mercury from taking hold. Can I send a sample to Swansea, and ascertain if there is any process that will work this? Can you give me the address of any party to whom I can send, and also how much I ought to send? If you will kindly do what you can in these matters you will add another and greater favour to the one already conferred.

Milk-street, B., May 17. EDWARD F. DOLE.

DRIFT MINING IN CALIFORNIA.

SIR,—The Dead or Buried river proper is a type of geological remains that is peculiar to California, where they occur in greatest number or strength along the belt or country that extends across the western foot-hills of the Sierra Nevada mountains, from Amador County to Plumas County. This belt varies in width from 20 to 35 miles, taking in its course the counties of Amador, El Dorado, Placer, Nevada, Sierra, and Plumas, across which it strikes centrally. There are also sections of these old rivers, with their overlying and outspreading banks of gravel in Tuolumne, Calaveras, Yuba, and Butte Counties, with formations of a similar character, but not so distinctively marked in the several counties that constitute the north-westerly angle of the State. But while all the counties mentioned contain these pliocene deposits in greater or less quantity, it is in Placer, Nevada, and Sierra Counties that they exist under conditions most favourable for easy exploitation, and appear to have reached their greatest expansion. Here, also, the most extensive and costly improvements for working them have been constructed, and here the business has reached its largest and best results. Usually the beds o- these rivers

are found at elevations varying from 100 to 500 or 600 ft. above the modern streams in the vicinity, although sometimes they are nearly on a level with the latter. In width the main channels range from 200 or 300 to 800 or 1000 ft., their branches, of course, being much smaller. They fall at an average rate of from 20 to 30 ft. to the mile, the grade diminishing as they proceed towards the south, where they gradually sink to a level too low to admit of their being profitably worked, and, scattering, lose their distinguishing traits, and finally disappear altogether.

In Plumas, Sierra, or Placer Counties the grade sometimes amounts to 60 or 70 ft. to the mile, being, in a few localities, even steeper than this. The deposits of auriferous gravel are mainly confined within the channels of the old extinct river beds, and are oftentimes overlaid with a capping of lava, gravel, sand, pipe-clay, and earth to a height of 500 ft., the great bodies of them forming the high ridges or divides that separates the tin streams or rivers of the present day from each other. While the gold is sometimes disseminated through the detritus, or overlying mass, it always increases in both quantity and coarseness steadily downwards, the bulk of it being found in the 10 or 12 ft. lying next the bottom or on the bedrock of the channel.

How Conducted.—By this method of mining the auriferous gravel is reached and removed through tunnels and afterwards washed in sluices, only the lowest strata of from 3 to 5 ft. being extracted. When there are not facilities for driving tunnels on the proper levels, shafts are sunk and made use of for the above purpose. The pliocene channels constitute the sites of the principal drift operations, which are mostly confined to the beds proper of the old rivers. When tunnels are available in this style of mining they are much to be preferred to shafts, as tending to promote ventilation, while they afford easier means for drainage and the removal of the gravel, being driven on levels sufficiently low to bottom the deepest part of the channel. From the main tunnel, when the gravel is tapped, gangways are run into the gravel at right angles to the tunnel, and the gravel is laid off into blocks for the more ready extraction. The gravel is picked or drifted out, shovelled into cars, and carried to the mouth of the tunnel and discharged on to the dump platform, from whence it is carried through the sluices leading therefrom, which are paved with blocks or riffles and charged with quicksilver. As the work of excavation advances, the ground above being left unsupported, gradually sinks down and closes up the space drifted out. Besides the strata of gravel removed, which will average 4 ft., from 4 to 6 in. of the bedrock is usually broken up and taken out with it, this, especially when it consists of slate set on edge, always carrying more or less gold.

Advantages.—Among the advantages that commend this class of operations over other methods of mining gravel may be mentioned the following:—For carrying them on with success comparatively little water is required, the tunnel run for opening up the ground sometimes affording enough to wash all the dirt taken out; and when this is not the case a sufficiency can generally be obtained from other sources at little cost. This style of mining can be easily and successfully prosecuted in almost any locality where there is a requisite amount of pay gravel, being nowhere beset by the insuperable difficulties that so often stand in the way of hydraulic operations. In the lessened demand for water drift mining is not only made feasible in places where the hydraulic plan would be impossible, but preliminary expenditure are, as a general thing, much less than become necessary in that branch of mining. Here neither the capacious canals and reservoirs, nor the costly plant necessary in hydraulic mining is called for; while the results, with only present experience, are quite as certain, and the net profits fully as large. In fact, the history of the principal drift properties of California will show that the net profit has averaged fully 50 per cent. of the gross product; a showing that cannot be met by either the hydraulic or quartz mines. Estimated by large superficial areas, the drift gravel has, as a matter of course, paid very unevenly, the output varying from $30,000 to $90,000 per acre. Occasionally spots have been struck from which as much as $50,000 and even $100,000 have been taken within a space not over 100,000 ft. square.

Among the drift claims that have distinguished themselves for a large aggregate production, and the most of which are still yielding fairly, may be instanced the following:—

Names of Mines.	Production to Date.
Niagara Consolidated	$1,400,000
Bald Mountain	1,300,000
Manzanita	1,250,000
Lin Yankee	1,200,000
Union	1,187,000
Jenny Lind	1,000,000
Deideshiemer	650,000
Damascus	1,500,000

There being scores of claims that have turned out from $200,000 to $500,000 and hundreds that have produced totals varying from $100,000 to $200,000 before the exhaustion of their small area. The annual yield of gold from this source amounts now to about $4,000,000, and is rapidly on the increase.

The figures presented below show the gross production made in some of the leading drift districts in California:—

Gibsonville and Whiskey Diggings	$23,000,000
Hurland Flat, Pine Grove, and St. Louis	26,000,000
Port Wine and vicinity	23,000,000
Forest City and Minnesota	31,000,000
Nevada City and vicinity	26,000,000
Liberty Hill	10,000,000
Little York and Gold Run	5,000.000
Forest Hill Divide	17,000,000

Drift mining, which, in consequence of the numerous mistakes made at first, had for many years been neglected, has lately begun to attract renewed attention, a most notable advance having been made in the business during the past few months. In no department of mining can ultimate results be calculated beforehand with more closeness than in drift mining. Indeed, it may much be questioned whether there is in the whole round of our industries another pursuit into which the element of uncertainty and hazard enter so little, or one from which judicious outlay and well directed efforts can hope for better or more permanent returns. EDWARD F. DOLE.

Milk-street, B., May 17.

PERSONAL PROFITS—THE PRIMARY INCENTIVE TO MINING—No. III.

SIR,—I do not state or intend to state that the natural conditions of success in mining are altogether disregarded, but that sufficient importance is not held to attach to them generally, and that if it were—and a corresponding prudence exercised in the practical and administrative departments—we should soon hear of more prizes and less blanks as resulting from this channel of enterprise generally. It is not a patriotic or philanthropic or sentimental pursuit, but one of business, to which capital is applied, with a view to its increase. One would, therefore, suppose that the salient features vital to its success would quickly rise into prominence, and be universally esteemed as the guiding lights to its apprehended destiny—that is, its produce and profits. Were it so, as it should be, sensationalism, what there was left of it, would merge in a justly pardonable enthusiasm—the effervescence of gladness, expressive of exuberant satisfaction.

Mining on the merits is too little esteemed; were it otherwise we should soon cease to be regaled with the gorgeously gilded bubbles of 500,000*l.* enterprises. Concerns destitute of mechanical appliances and developed resources ought not to be regarded but as speculative enterprises—questionable sources of profit yielding wealth. The trifling with funds in a spirit of licentiousness as if mining meant no more than a game of chance, or as if the designation expressive of its practical purport and general subserviant utility meant no more than the toss of a coin for the choice of corners or for the side of a river in a boat racing contest. The difference between mining as a practical pursuit on the merits of the mines themselves and stock board mining are widely different pursuits, both as respects conduct and actual results. The one is a public benefit, the outcome of personal or personally united enterprise, restricted not to the proprietary, but extending almost immediately to local communities and indirectly to communities more remote, adding variously to their resources and largely to the wealth of the state or states of which they severally constitute a part. Acquisitions from such sources are positive benefits, valuable in proportion to the material wealth they develope and the amelioration and improvement of handicrafts, trade, and commerce, which they inevitably promote and sustain. But the principal consideration—that which affects the interests and influences the action of individual adventurers—is the prospect of profits more or less assured or supposed to be. A profit of 20,000*l.* per annum on a capital of 50,000*l.* would yield a dividend of 40 per cent., whilst the same amount of profits on a capital of 500,000*l.* would yield a dividend of 4 per cent. only. Is it of no moment then at what first cost investments are made? A leading article in the *Mining Journal* of April 19 states that seven properties, styled farms, in the Transvaal, including the Lisbon and Berlyn, were originally purchased at 33,401*l.* 14s., and subsequently sold at no less a sum than 732,000*l.*, being a difference of 698,598*l.* 6s. What has become of that money, and what was there to justify that difference? The respective subscribers to that aggregate contribution will probably say at some time or other that it was put into mining, and execrate the industry for follies wholly their own. Put into mining, forsooth, not one-twentieth of it. It went into the pockets of the promoters and their hired assistants, whilst mining will suffer to the extent of the nineteen-twentieths; and that may not be all, as the prices at which they were severally put on the market may and probably do increase the aggregate by several thousands of pounds more. What was there to justify the difference of the prices first and subsequently paid? In respect of some of the farms it is stated that gold was not discovered at the time of first sales. But does the discovery of gold at any particular locality justify the payment of large sums for the privilege of ascertaining in what quantity it abounds.

Gold is extensively disseminated. We have it here in the soil and subsoil, presumably disintegrated and washed from the adjacent hills, where no reefs of quartz-bearing gold are known to exist; yet rich specimens of gold ores—that is, free gold associated with iron and quartz—have been found at the outcropping of the richer silver bearing lodes of the district, but it is not presumable that the gold found in the alluvium came from those sources, but rather is it inferable from the relative situations that it is a product of the disintegration of the igneous rocks (basalt) principally, which form the crests of the hills above. What there was, if anything, to justify the difference of prices in the purchases and sales of the properties in question will be further considered in my next letter.

Ione, Nye County, Nevada, May 12. ROBERT KNAPP.

MINING IN THE WESTERN PYRENEES.

SIR,—Believing with Von Groddeck that the study of mineral deposits is essentially "a branch of geology," I would ask space for some notes on an almost totally undescribed mining district in Spain, which illustrates the correctness of the opinion of the eminent practical miner and geologist of Clausthal. I must ask indulgence for referring to my own writings, because occupying myself with regions known only to French and Spanish observers, I have usually published my observations in French, so that they might benefit by the criticism of those able to detect their errors.

About 16 years ago the mines of this district were almost totally unknown. I then became acquainted with them in the course of geological excursions throughout the Pyrenees, and while studying the historical records of the country, and I determined to investigate them with special care. After some years spent in the study of the history and institutions of Spain, and in acquiring knowledge of mining at the chief mining schools and in various mining districts, I commenced my task by executing a geological map of the western extremity of the Pyrenees. This map, published by the Geological Society of France, has been found accurate by the Spanish Geological Survey, who have, with most handsome avowal, reproduced the portion relating to Navarre, in their recent description of the geology of that province; and, as regards the other regions comprised in it, no error has yet been detected, so that I may fairly refer to it as accurate in essentials. I next proceeded to study in detail every ascertainable mineral deposit in the district, and received every assistance and information from the few engineers, investors, and authorities who had become alive to the resources in their hands. I found a prevalent opinion that the mines of the district were worthless. I ascertained that this opinion rested upon pure ignorance, hearsay, and the ridiculous mining adventures of peasants without capital, skill, or means of transport. This last essential is being now fully supplied by the local authorities; a few mines rationally worked have already yielded brilliant results, and, as commonly happens in Spain, unbounded enthusiasm is replacing former apathy. The peculiar advantages of the district are a healthy climate, moderate elevation, unlimited timber, and constant water-power, conditions whose absence is fatal to most mining districts in Spain; while the people are the most orderly of Spaniards, brigandage is unknown, and active and intelligent labourers can be obtained at an exceptionally low price. Both the character of the rocks and the economic conditions totally distinguish this district from the more Alpine portions of the Pyrenees, and the numerous authoritative observations unfavourable to mining which have been published regarding the Pyrenean chain, have always expressly excepted this district from their scope. Pedestrian exploration of the entire chain, and the perusal of the literature relating to it, that I have been able to find in the Paris and provincial libraries, have confirmed me in the selection of this district as the one most favourable to fruitful observation in the Pyrenees.

The detailed geological mapping of the district proved in the first place that all the chief lodes were situated in palæozoic and new red sandstone rocks, and not in the cretaceous formation, as had been represented in previous and compiled geological maps of Spain, such as that published by De Verneuil in 1869, or that of Botella of more recent date, all previous maps being too purely theoretical to be worth attention. Regions represented as palæozoic similarly turned out to be unquestionably cretaceous or gurassic; their fossils, submitted to the best palæontologists, removing all doubt; and even many square miles represented as cretaceous were successfully relegated to the coal measures, which had been supposed almost totally wanting in the Pyrenees. Thus at once a sharp distinction was established between mines possibly rich and such worthless deposits as are usually found in the later geological formations of Europe. These last deposits being sometimes extremely pretty, and easily detected, had been frequently worked, with the painful consequences that might have been expected. Recent observations have enabled me to extend this result to other districts, and to confirm it in detail, thus a most curious mercury vein observed many years ago, and condemned as an exceptional accident in the upper cretaceous formation, has proved to be a lode of great strength, comprised in rocks of palæozoic and new red standstone age. Iron and calamine of course occur to some extent in the newer rocks.

Again, a whole group of mines, vainly worked in former times by sanguine peasants, proves to be a series of irregular impregnations extending throughout particular palæozoic limestone, which is constantly traversed by dykes of porphyritic diabase, and immediately underlaid by barren pegmatite. These deposits, recognisable at many points, have been repeatedly submitted to my judgment, and can be safely condemned as unworkable, besides being unfit for working, through dispersion of the ore, and admixture with barytes. Beautiful specimens are occasionally obtainable, and the mineral extracted at ruinous cost is highly argentiferous. Silver-lead, blende, copper pyrites, and even grey copper are thus found dispersed, and in places present for a few feet some resemblance to regular veins.

A particular group of metamorphosed sandstone of Devonian age presents a similarly abundant dispersion of mineral. Sometimes when informed of a mine where this geological formation can be expected I have simply gone straight to the point, where it is cut by a gorge or other hollow, and there found the mine, together with the proofs of useless expenditure. In other cases, where this formation forms the outer shell of a mountain, trial holes may be recognised in all directions, executed in a vain hope of discovering the supposed vein, the entire rock being traversed by strings and spots of ore.

Even in the slates of the Devonian formation there is a particular level where impregnations occur. I was once informed by an English mining captain that he had been shown a copper lode 17 yards in thickness. Aware that he had seen it in a particular region of worthless impregnations, I somewhat reluctantly undertook a visit to the spot. I found an irregular impregnation of strings of copper and iron pyrites, beside a thick dyke of a kind of diabase, which I have found under the microscope to be occasionally impregnated with copper pyrites, and which is always rich in microscopic mundic. In rocks of the same age I have found a similar impregnation of over 50 yards in thickness, which extends through a considerable mountain. In this latter case the tenderness of the rocks and exceptional facilities for washing have suggested schemes of work, but in the former example the constant presence of tough quartz, associated with the copper, would have occasioned ruinous wear of the rolls.

As might be expected, the true fissure veins are in intimate relation to the chief lines of fracture and dislocation presented by the district. The veins are usually of that compound type which is commonly associated with dislocation. As yet I have examined and mapped about 60 true fissure veins. The most important are either parallel or at right angles to the chief lines of dislocation. Their presence is usually indicated by patches of new red sandstone on the neighbouring summits, which have been let down by the agency of faults. Minor fissures usually occur crossing the main lodes, and filled with mundic, fluor-spar, and occasionally blende. The outcrops of the chief lodes are often difficult to trace, but I experience an increasing facility in tracing them, through daily practice in tracing the outcrop of beds and dykes. In fact, the tracing out of the back of the lode is a pure matter of practice in mountain geology. The district is divided into two masses of palæozoic rocks by an intervening syncline of new red, gurassic, and cretaceous (formerly mapped as palæozoic, until characteristic fossils rewarded my excursions in 1868). The western mass is rich in lead, with hardly a trace of grey copper; the eastern mass is probably the richest region for argentiferous grey copper in Europe, but presents not a single well defined lead vein.

The grey copper contains from 10 ozs. to 300 ozs. of silver to the ton; but in some cases the silver is replaced by mercury, and some of these latter veins pass into cinnabar lodes of considerable strength and persistence. The whole region may be said to be impregnated with grey copper; but well-marked fissures are rather rare, and when they do occur contain splendid masses of ore. The geological problem is the recognition of the essential conditions and consequent situation of the chief existing fissures. The outcrops can be easily traced where they cross particular bands of rock, and the main fissure lodes are ranged along particular lines of dislocation. Thus all the grey copper mines as yet opened are ranged along two parallel lines running at right angles to the chief lines of dislocation clearly indicated by the results of geological mapping, and the important lodes are either at right angles or parallel to these geological lines. The important lead lodes of the western region are similarly related to the chief lines of dislocation; they are also ranged along particular lines, and are connected with two granitic axes, one of which I only lately discovered. The variations of detail illustrated in Moissenet's ingenious work on the Cornish veins of course obtain to some extent; but their influence is less than might be expected. The imperfections of Spanish maps are the main difficulty in such observations, but direct topographical work usually confirms the regularity of the geological lines.

Copper pyrites occurs mixed with the grey copper, but there appears to be a particular band of copper pyrites lodes, containing only occasionally iron pyrites in admixture. In one of these 40 fms of superficial research galleries have yielded about 25 tons of copper ore of above 22 per cent. copper. The washing of the ore was so simple that I constructed the necessary appliances with the help of a village carpenter, and in a few days taught the men to produce ore of over 20 per cent. by hand jigging. The low price of labour makes such expedients important in Spain. This ore has been found to contain nearly two-thirds of an oz. of gold to the ton, and the presence of gold appears common in the copper pyrites veins. One was recently worked as a gold mine by some English speculators; but it consisted of irregular strings of copper pyrites, mundic, and specular iron, crossing a large river in very porous sandstone. A very accurate reproduction of a Cornish horse-whim was erected, then a strong hand-pump was imported from England; but attempts to pump out shafts at a few yards from the river banks were naturally unsuccessful, even supposing they had been worth making. Another copper mine, known to the neighbouring peasants as "The Gold Mine," and containing old superficial stopes from 2 to 4 yards in width, I intend reopening this summer, but the first task will be the re-washing of the stuff rejected from the primitive appliances formerly employed. In another copper mine, of little promise, but containing a little gold and silver in the ore, the peasant adventurers endeavoured to smelt by means of a kind of lime kiln fitted with two tuyers supplied from hand-bellows, while the hard quartzose ore was crushed by mule power.

As yet only two lead mines have been seriously worked; all others in the district have been worked by ignorant peasants, and before transport facilities existed, so that attempts to smelt at the mine mouth resulted in loss of silver, failure, and disgust, when the trifling capital invested had been squandered on furnaces and random adits. Of the two lead mines in question, one has attained a depth of 115 fms., at which depth lead ore yielding 190 ozs. of silver to the ton of lead is being extracted. The lode at a moderate depth becomes one of the finest in Europe, presenting masses of nearly pure fluor-spar richly interspersed with lead and varying from 6 ft. to more than 20 ft. in thickness, these rich parts occupying about half the area of the lode. This is the only mine in the district supplied with a well-arranged dressing-floor, and it is directed by a highly competent Clausthal engineer. Another lead mine directed by an engineer of the Madrid and Freiberg Mining Schools is yielding, in spite of present prices above 3000*l.* net profit per annum to its proprietors, who originally invested about 60*l.*, and have paid all expenses from the commencement out of their quarterly returns of ore. Such results of skilled work afford hope that the experiments of ignorant mining foremen totally unacquainted with the peculiarities of the country will not ruin the prospects of this interesting district. But an instance of this latter method of mining deserves mention. In one part of the country there is a group of iron mines, one of which, recently developed by an engineer of Freiberg training, is now fully prepared to deliver some 50,000 tons of ore yearly, certainly for many years. These deposits run into a mass of granite and there become sterile, occasionally presenting a little highly impure ore in crusts of killas sticking on the granite. These worthless portions had of course been left out of the concessions secured under skilled advice; but they attracted the attention of a certain foreign "count," who obtained specimens of splendid brown hematite which occur as mineralogical curiosities in occasional geodes. Parties from England who knew nothing of the country were conducted to the new concessions thus secured, and were much impressed by the magnificent outcrops rising before them on the farther side of the boundary lines. About 100,000*l.* was expended. Levels were driven under the sole direction of ignorant foremen; one of these, intended to cut a lode, describes a semicircle; another is run through hard granite, and cuts the lode at a depth where, owing to its hade, it lies entirely within the concession of the neighbouring proprietors. Magnificent wire tramways, constructed by skilled specialists, were rendered ineffective by the senseless introduction of hand labour at the connecting stations, and by the employment of timber rendered worthless by the practice of bleeding for resin in the district from which it was selected. The affair has since passed into other hands for the very reasonable purpose of utilising the machinery for bringing down the ore of the neighbouring mines.

Such performances give a bad name to a mining district, and much prejudice was for a time excited. A French engineer at that time condemned a lead lode as a worthless superficial pocket. I was subsequently consulted as to its value, and undertook to develope it. A careful survey and a few days work with two peasants armed with picks proved the existence of the lode along more than 600 yards of regular strike. Subsequent mining confirmed this result by cutting the lode at each extremity, and a small research gallery

driven for 10 fms. along the central portion, at about 3 fms. from grass, yielded about 10 tons of tolerable lead ore, with over 20 ozs. of silver to the ton of lead. The ore was already incomparably superior in the floor of the gallery to what it was in the superficial trench, which had disgusted the above-mentioned engineer. This mine being situated within the French frontier, further work has been suspended, owing to the difficulties and delays of obtaining a concession in France, or even a temporary permission to sell the ore extracted. It is curious that the Spanish administration afford every facility and assistance to *bona fide* work, while the French mining administration appears determined to disgust adventurers. Such annoyances as occur in Spain are usually due to ignorance of the language, customs, and manners, on the part of foreign adventurers; in France they are due to the same system of routine, which is the bane of the shipping interest. During the last 20 years the Spanish authorities have reformed nearly every vexatious anomaly in their mining law, while in France the old principles are still fruitful in serious worry. In opening the above-mentioned mine I unearthed old workings executed about 400 hundred years since, and workings of a similar date exist in other mines, probable stopped by the internecine wars which prevailed at that time. Superficial Roman workings of vast extent also exist at some points. A German engineer employed at the beginning of this century by the Madrid Government has left an account of the Roman workings examined by him in a single valley. He describes them as the most important in Spain, stating that he had already visited those known in other parts of the Peninsula, and he estimates that it would be difficult to walk through them in fifteen days. Recent explorations of these workings have confirmed the correctness of his account, and an American diamond drill has just been fixed above the lodes thus worked by the Romans, with the intention of proving their quality in depth preparatory to sinking a pumping-shaft. In two other valleys galleries more than 600 yards in length are monuments of Roman work; medals, pottery, and other articles confirming their date. Much work was also executed by the local peasantry about 35 years since; but the adits are almost invariably directed at random. A few weeks since I opened the mouth of one of these adits by about three weeks' work, after which I was able to enter for a distance of more than 200 yards. The gallery had been driven at about 45° from the strike of the lode, which consequently it did not attain, although a much shorter distance would have sufficed with correct direction. A few days since I completed a survey of two silver-lead mines, in each of which nearly 100 yards of adit had been driven to within a few yards of the lode, and then abandoned for more than 30 years; in the one case the dip of the lode being ignored, and in the other the adit being driven nearly parallel to the lode. Many similar cases might be mentioned. The washing of the ores proved also an insuperable puzzle to the peasant adventurers. Even at the present day crushing rolls specially constructed to be worked by mules are ordered from the rainless region of Carthagena, and set working by mule power beside splendid streams, where with the help of a village carpenter and smith an amply sufficient water-wheel could be installed in two or three weeks. Such is the force of the rule of thumb.

The iron deposits of the district form, as elsewhere, a special subject. About 80 Catalan forges were formerly supplied by the hematite outcrops, and not many months since I witnessed the ancient Catalan process still in full operation not 15 miles from where I write. The iron produced by it is so superior that friends of mine have their mining picks made in these forges, and in my own experience such expedients are preferable to buying the worthless tools supplied by certain French firms. Owing to the cheapness of charcoal cast-iron is now produced on a considerable scale, commanding a fancy price for its superior quality.

The iron deposits are of three kinds—metamorphic beds, impregnations, and true fissure lodes. The beds are due to the chemical conversion of a particular band of limestone by the agency of granite, porphyry, or diabase. They present masses of spathic iron rich in manganese, with occasional admixture of blende, lead, and iron pyrites, passages to ankerite and largely crystalline calcite, and outcrops of brown hematite riddled with quartz. A band of eklogite, of considerable extent, traverses one of these iron deposits, and is the apparent cause of the presence of a mass of magnetic iron—a striking instance of the habitual association of that ore with garnet. The impregnations are of specular and micaceous iron, and are produced, together with gypsum, by the so-called ophites of the Pyrenees. The microscopic examination of a large number of outcrops of ophite, carried out with the assistance of Professors Fouqué and Michel Levy, enabled me to prove that these rocks were either diorite or diabase—a result since confirmed by a similar examination made in Germany. They are very similar to the diabase of the Hartz. Other rocks submitted to me as ophite have proved to be varieties of elvan proceeding from neighbouring granite; and these researches have enabled me to conclude that the ophites have no intimate relation to the lead deposits, while they are often closely connected with the copper and iron deposits. A few days since, in a village towards Pampeluna, I found some peasants engaged in deepening the village square, which they were cutting down in one of the largest masses of micaceous iron I have ever seen, and they were extremely curious to know what it was. Wherever the ophite occurs together with the new red sandstone formation, masses of specular iron may be found; but these deposits are rarely of industrial value. The true fissure veins of spathic iron are among the finest in Europe as regards size, but they are frequently run through with copper pyrites, and those of the purest quality will not be workable till the completion of a railroad now in construction. Having obtained by analysis 24½ per cent. of copper from the pyrites scattered in one iron mine, I advised its careful separation, and about 5 tons of copper ore of nearly 10 per cent. copper was thus obtained from about 100 tons of the iron ore. In another case, 1 ton of similar ore was easily separated in breaking 100 tons of iron ore. I have traced the outcrop of some of these lodes for distances of two, and even three miles. They attain in places a thickness of over 15 yards, while the beds attain nearly 30 yards. Their industrial future will greatly depend on the nature of the Bilbao deposits as regards permanence of present yield.

Similar instructive problems are presented in many other districts of Spain. Bad climate, insecurity of life and property, and want of wood, water, and transport are, however, serious obstacles in the central and southern districts. As regards the more favoured regions, I shall hope to take another opportunity of writing you.

St. Jean de Luz, May 31. P. W. STUART-MENTEATH, A.R.S.M.

WEST MOUNTAIN MINING DISTRICT.

SIR,—This district commences about 22 miles south-west of Salt Lake City, and is situated on the eastern slope of the Aquirrh Mountain range. The principal geological structure of this district is quartzite or vitreous sandstone, and dolomite or magnesian limestone. The quartzite appears in beds of great dimensions, with thin seams or bands of shale, which separate the strata at intervals of from 100 to 500 feet. In the southern, south-western, and south-eastern portion of the district two beds of limestone from 100 to 300 ft. in thickness are observable from the south-east in most irregular foldings and frequent dislocations of the strata, which at present show a general strike of north-east and south-west, and dip north-west at angles varying from 20° to 80°. In several of the breaks and faults large dykes of dioritic and hornblende porphyries appear. They are extraordinary frequent and well defined in the southern and south-western parts of the district. The presence of these igneous rocks occupying the breaks of the strata verifies the origin of such disturbances as have upheaved, folded, and broken the sedimentary beds. Ore deposits appear in this district. As beds between the strata forming bed or strata veins, examples of which are—Old Telegraph, Spanish Hill, American Flag, Utah, Jordan, Neptune, Revere, Lead, and others appearing and situated all in one belt.

As contact veins between limestone and quarzite, limestone and shale, quartzite and shale, syenite and quartzite, syenite and limestone—To this class belong the Jordan, Neptune, Grizzly, Ashland, Winnamuck, and others.

As true fissure veins in the syenitic porphyry, such as appear at the head of main Bingham Canyon, beyond the Jordan and Neptune Mines; also as true fissure veins in the diabase, diorite, and syenite porphyry in Black Jack Gulch and Butterfield Canyon, examples of which are—Bemiss and Hiatt, Queen, Old Times, New Times, Boston, Russell, Fisher, Badger, French Spy, Summit, Red Cloud, Liberty, Louisa, Zuni, Montercy, Osceola, and Lucky Boy, Black Jack, and Opulent Mines. These veins carry ruby and wire silver.

As fissures or gashes breaking through the strata, to which a great number of the Bingham ore deposits belong.—It would take to much time and space to explain the nature, character, and merits of the different classes of ore deposits to their fullest extent and meaning in this. The quantity and quality of ore in any of them are the true and only standards of value for both miner and capitalist.

As bed and contact veins must necessarily conform in strike and dip to the inclosing stratum with all its foldings, slips, distortions, and disturbances of any kind incidental to the upheaval of the same, folded into anticlinal and synclinal curvatures, so it will clearly appear that the strata are the true guides of the bedded veins at any point along the course of the vein.

Syenite, diorite, diabase, and granite appear first at Black Jack Gulch and Butterfield Canyon, and again at the head of main Bingham Canyon, and extend thence over the divide into Poole County in a westerly direction.

The ores in West Mountain mining district appear principally as galena, carbonates, and sulphurets of lead, oxides of copper, ruby silver, and free gold. The latter is found in the alluvium, and occasionally in small quantities with the ores. The impurities in these ores are—Pyrites of iron, pyrites of copper, decomposed pyrites, oxide of iron, and arsenic. The percentage of the ore varies from 12 to 120 ozs. in silver, from a trace to $30 in gold, and from 30 to 54 per cent. of lead per ton.

THE PRINCIPAL MINES.

The Old Telegraph, comprising the No You Don't, Nez Perces Chief, Montreal, Montana, Old Telegraph Nos. 1, 2, 3, and Grecian Bend Mines. This mine could and should be at present the most productive, and would be so if managed by men like L. E. Holden and W. M'Queen. The vein is at places over 45 ft. wide, presenting a solid breast of ore. The timbering of the works is all that it could be. The greatest depth attained is 400 ft. below the summit of the hill. Jordan and Galena Mines, situated to the west of the former, are very extensively developed, and have produced great quantities of good ore.

Revere group, situated easterly of the Old Telegraph, has attained a depth of over 800 ft. on the vein. Eight levels have been run east and west 100 ft. apart. Thousands of tons of low grade ore are in sight. The mine has produced at an average 25 to 30 tons of ore per day for years; assay, 30 to 45 per cent. lead, and 10 to 25 ozs. of silver per ton.

Attached to the aforesaid mines are the Jordan Smelting and Concentrating (Aufbereitung) Works, consisting of six shafts, one reverboratory furnace, and extensive concentrating and leaching works, situated on the Jordan river and canal, near the junction of the Utah Central, Denver, Rio Grande, and Bingham Canyon Railroad. The company has at the Old Telegraph Mine a steam saw-mill.

Yosemite group, situated east of the Revere, produces with a force of 35 men about 400 to 500 tons of good ore per month. The mines are largely developed. The ore averages 50 per cent. of lead and 20 ozs. of silver per ton.

Spanish Mine, situated between the Old Telegraph group and the Jordan Mines, has produced large quantities of ore, and is developed by about 26,000 ft. of tunnels, drifts, inclines, and stopes. The ore is concentrated at the mine.

Neptune and Kempton Mines, situated south-westerly of the Jordan, are developed by about 30,000 ft. of inclines, shafts, tunnels, drifts, and stopes The main tunnel is over 600 ft. long, and connected by a long level on the vein with the main incline, which is over 400 ft. deep. The mine has produced in the past large quantities of ore, and produces at present the finest and best ore, with profit to the owners.

The Stewart Gold Mines disclose an enormous body of gold ore to a depth of over 200 feet, the body being from 80 to 400 feet wide, averaging $8 to $10 per ton. Attached to the mines are two ten stamp mills.

The Atlanta, San Francisco, and Irish American tap four veins, with a 900 ft. tunnel, at a depth of 600 ft.

The lead mine group has opened an enormous body of galena and carbonate of lead ore; employs 30 to 60 men; making rapid and extensive developments. The main ore body is from 60 to 100 ft. wide, containing low grade carbonate ore of which 50 tons are reduced in the lead mine concentrating works to 12 tons of ore assaying 62 per cent. lead, and 6 to 10 ozs. in silver per ton. In what was for a long time supposed to be the footwall milling ore has been found lately assaying 1 per cent. lead and 40 to 300 ozs. in silver per ton. The principal works of the mine run towards the Yosemite Mine at a rapid rate under the able superintendency of Nicholas Treeweek. Attached to the mine is a good boarding house. From the mine to the mill a tramway 4½ miles long conveys the ore. At the lower end the cars dump into the top of the mill 100 ft. above the point where the ore leaves as concentrated ore. In entering the mill the ore dumps over the grizzlies (grates) separating the coarsest, the same falling on a slide and the finer going to and through the rock breakers, from here to the Cornish rolls, thence through five revolving screens, one below the other. These screens have each a collecting fan from which a spout runs to the jiggers. These jiggers have the usual varying stroke, and size of screen to suit the size of the ore; they have a velocity of 200 to 450 revolutions per minute, and a stroke from 7-12 in. to 1-16 in. What is called the slimes or tailings go to the slime tables and the earth settling sluice, and finally through a jigger constructed for that purpose. The mill is operated by steam, employing 13 men for two shifts day and night.

True Fissure group, extensively developed; the lower tunnel taps the vein at a depth of 500 ft., and is 410 ft. long at that point. The vein is 18 in. to 5 ft. wide, contains galena, carbonate and oxide of lead, and, in the upper workings, black sulphurets. The True Fissure is one of the Old Reliables coming treasure chambers. The Tiewaukie and Accident Mines have opened a large ore body of rich ore, extensively developed, carrying galena, hornsilver, and wire silver. The Winnamuck and Dinie Mines group and smelting works belong to a Holland company, and are situated just below Bingham. These mines are developed by over 40,000 ft. of tunnels, shafts, inclines, drifts, and stopes; they are among the oldest mines of the district, and have produced immense quantities of ore.

The Queen, Bemis and Hiatt, Chubb, Montercy, Russell, Boston, Arthur, Fisher, Garfield, Badger, Louisa, Zuni, New Times, Summit, Liberty, Red Cloud, Northern Chief, Nellie, French Spy, Eagle Bird, Opulent, Lucky Boy, and Black Jack are extensively developed to a considerable depth by tunnels, drifts, shafts, and inclines, disclosing to the eye large bodies of ruby silver and other ores, valued at from $20 to $300 per ton.

The Northern Chief Mining Company are erecting extensive first-class reduction works in Butterfield Canyon in connection with their mines. Their tunnels are from 200 to 1400 ft. long, tapping the lodes at a depth of from 100 to 1500 ft. Those mines are situated in a formation of diabase, diorite, and syenitic porphyry.

Last Chance group, extensively developed, with a brilliant prospect for the future if their works are continued.

Prominent among the other valuable mines are the Agnes, Ashland, Aladdin, Albino, American Flag, Alameda, Argonaut, Apex, Amanda, Amazon, Alamo, Alice, Ashton, Alta, Austin, Bully Boy, Bargain, Bull Dazer, Bret Hart, Buckeye, Bullion, Bobtail, Baby, Black Hawk, Benton, Bazoak, Buffalo, Backer, Burning Moscow, Canby, Commercial, Constitution, Crœsus, Col. Sellers, Cosco, Colorado, Charles Dana, Centennial No. 2, Chicago Fire, Champion, Central City, Caledonia, Carbonate, Dixon, Dartmouth, Domingo, Dividend, Dalton, Ely, Elvina, Edison, Extension, Elephant, Eclipse, Fraction, Fliess, Flint, Fanny Bemiss, First Chance, Fairview, February, Flyer, Flora, Florence, Fabian, Gray Eagle, Grizzly, Grecian Bend, Grand Cross, George, General Shelby, Giant Chief, Green Grove, Gold and Silver, Gold Crown, Golden Era, Georgia, Grand Duke, Grand Duchess, Granite State, Gibbons, Henrietta, Hydaspe, Henry M., Hamlin, Horace Greeley, Honest Abe, Hampton, Howard, Hooper, Hoogley, Hibernia, Ingersoll, Irish American, Jersey, Kanosh, Kitty, Knickerbocker, Keep a Pitching in, Live Yankee, Live Pine, Levant, Lucky Boy, Lulu, Miners' Home, Melissa, Merrimac, Miners' Dreams, Murray, Mill Creek, Mountain Gem, Mountain Maid, Martin, Mighty Dollar, Mystic, Maple Tree, Monitor, May Flower, Nina, Northern Light, Nick of the Woods, Noonday, National Greenback, North Star, Nast, O.K., Oavyhee, Ole Bull, Omaha, Osceola, Overland, Old Hickory, Parma, Peabody, Portland, Providence, Phœnix, Parker, Prince of Wales, Parvenue, Pay Roll, Quakingasp, Queen of Sheba, Queen, Rough and Ready, Rainbow, Red Warrior, Roman Empire, Red Rover, Rattlesnake, Rising Moon, Roman, Railroad, Rustin, Sacred, St. John, St. Bartholomew, Saginaw, Savage, Sturgis, Silver, Comstock, Sunrise, Sunset, Silver Shield, Silver Maid, Star of the West, Silver Gauntlet, Saint James, Stanley, Salt Lake, Southside Tunnel, Stevenson, Thomas Jefferson, Tipperary Boy, Tiger, Tulare, Torpeda, Toronto, Tilden, Utah, Ultra, Venus, Veto, Vespasian, Victor, Vanderbilt, What Cheer, Washington, Wide Awake, Wide West, Winebago, Williams, Yampa, Yankee Blade, Western Chief, and others.

I must not fail to mention the placer mines of this district, which produce considerable gold, and average from $3 to $9 per day to the men. The principal placer mines are in the main canyon and in Bear Gulch. W. BREDEMEYER, M.E., U.S. Mineral Surveyor.

CHILE GOLD MINE.

SIR,—The directors of this company have just issued their report for 1883, and it is, in my opinion, a most melancholy document. To begin with it does not, I think, argue much for the administration of the company, that the accounts cannot be presented to the shareholders until five months after the expiration of the year, and some improvement in this respect is urgently called for.

The accounts show a profit of 9973*l.*, but this result is arrived at by treating as an asset the sum of 6797*l.*, being preliminary expenses and law expenses in Venezuela, not yet written off. This is the result obtained by an expenditure of something over a quarter of a million, in addition to the ordinary share capital. The only matter on which the directors appear to be able to congratulate the shareholders is that instead of making only a profit of 9973*l.*, there is not a balance on the wrong side, seeing that it is no uncommon thing for similar enterprises to require years before they can cover working expenses.

The directors have refrained in the present report from expressing any convictions. Another matter to which reference is altogether omitted in the present report is in regard to the sulphurets. The reason is obvious to anyone who read the secretary's report on his return from the mine, but I merely refer to it in order to point out in one direction where a lot of the company's money has been sunk. The directors' report seems to be rather in conflict with the secretary's report. The former say it is to the quality of the ore we must look for hopes of future profit; but the latter, if I remember rightly, stated it was to the quantity we must look. Again, the directors explain the fact that the estimates in the report of 1882 have not been realised, in consequence of the ore yielding only 1·30 oz. per ton, instead of something like 2 ozs. But if your readers will refer to the report of 1882 they will find that the directors estimated the profit for 1883 at 39,000*l.*, and they add, "This estimate is based on past results without taking any account of the prospective increased supply of ore of higher percentage of gold that may be expected as a result of the opening up of the mine.

The report states that the experience of 1883 demonstrates that, "Ore producing 125 oz. per ton, just pays its cost of winning." This statement appears to me to be very misleading, because in 1883 a large amount (some 32,000*l.* or more) was taken from revenue account and spent on capital account, a thing which is not supposed to occur every year. Indeed, the directors themselves point out that only 13,000*l.* will be required this year on capital account, so that if the mine does this year the same as it did last, there ought to be an additional 19,000*l.* available for dividend.

There is only one more matter to which I wish to draw attention and that is the purchase of the New Mexico Concession. It does seem peculiar that while the Chile Company itself is in want of money, and the directors are begging the shareholders to take up the remainder of the debentures, the directors should spend over 13,000*l.* in another concession 9 miles away from their own property, which they have, at present at least, no money to work. It is to be hoped that at the meeting, the whole history of this affair will be carefully enquired into.

It is most important that hereafter the monthly remittances should be regularly published, as well as the monthly production, stating the quantity of tons crushed, the number of stamps, and the number of working days. This ought to be insisted on.

June 4. R. W. Y.

MINING AND SCIENCE UNIVERSITY.

SIR,—Referring to the subject of the proposed degrees at the Royal School of Mines, I think it very desirable that men should be able to graduate there, as it would undoubtedly enhance the value of the School as a professional institution in the eyes of the mining world,

But what we want in connection with that School—far more than degrees—is more *practical* training. The South Kensington authorities have taken a move in the right direction by providing mining students with practical instruction in surveying. Hitherto the Associates have found themselves most severely handicapped in the commencement of their professional career, for unless they can afford to supplement their scientific knowledge by practical work in the Freiberg or some other academy, they must, as in my own case, gain practical experience by hook or by crook, as it were, during professional hours. Freiberg is in the centre of a great mining district, but London is a long distance from one; therefore mining students studying there can never obtain sufficient experience by one or two excursions in the course of the year to metal and coal mines; but is it not possible to found or to affiliate two local schools as branches of the main institution? There might be one in the centre of the Cornish metalliferous district, and one in the centre of the Yorkshire or other coal field. To either or, better still, both of these students could be drafted for a certain number of months in each year of the course to gain that experience without which a mining engineer is only half educated.

You are at liberty to make what use you like of these remarks without my name.—*Tyburnia, June* 4. A. R. S. M.

[Original Correspondence continued on page 674.]

ANGLO-POLISH LEXICON.—Among literary works of useful category an Anglo-Polish handbook was greatly wanted, for the study of the Polish language, by the English and Americans, especially during their travel on the continent, where there are so many famous places and establishments for mineral waters, and where, failing other languages, the Polish is generally understood. This handbook has been at last compiled by Mr. JOHN JOSEPH BARANOWSKI, formerly under-secretary to the Bank of Poland in Warsaw, and, since the revolution of 1830, emigrant residing during many years in England. It is printed at Warsaw in a very practical manner, as follows:—For the preliminary knowledge of the Polish language, there is an explanation of its principal grammatical rules, in English text. After this each page is tabulated in three columns—First, for the English words most frequently used in conversation and correspondence; second, for the Polish translations of the English words, in their common and figurative sense; and the third column for the pronunciation of the Polish words by English syllables. The third column gives an immense value to this lexicon, as there has not hitherto been any indication how Polish words could be pronounced by English syllables. Moreover, there is an annex to this lexicon, containing a fairly large collection of dialogues in both languages, specially adapted to various circumstances whilst travelling; of English and Polish proverbs, which cannot be translated literally; of forms for writing and addressing letters in Polish, &c. In a word, the work is unique of this kind. It is portable, useful, elegantly bound, and not very dear, as it can be purchased for 10s. at the office of Mr. Baranowski, 10, Duke-street, St. James's, London, S.W.

THE APPLICATION LIST WILL BE CLOSED ON 24TH JUNE INSTANT.

The famous Silver Mines at Kongsberg, worked by the Norwegian Government, have made large profits, which in the last 50 years alone have amounted to a total of at least £1,172,743, besides paying large sums to the Communes and for pensions, &c.; and although worked on a limited scale and without the advantage of improved modern machinery.

The KONGSBERG CONSOLIDATED COMPANY acquire a very extensive and valuable property, comprising 16 mines, which have formed a portion of the group which have been so exceedingly successful. From these 16 mines alone silver of the value of nearly £600,000 has been produced from comparatively shallow workings, the mines still carried on by the Government having continued very rich to their present depth of 300 fathoms.

KONGSBERG CONSOLIDATED SILVER MINES (LIMITED).

(Incorporated under the Companies Acts with Limited Liability).

CAPITAL £120,000, IN SHARES OF £1 EACH.

Payable 2s. 6d. per share with application, 2s. 6d. on allotment, and the remainder by instalments not exceeding 2s. 6d. each, nor oftener than once in two months.
If no allotment is made the deposit will be returned in full.

DIRECTORS.

WM. DUNN, Esq., Director of the Bratsberg and the Oscar Companies.
Major R. HEANE, Director of the Oscar Gold Mining Company.
J. H. MURCHISON, Esq., F.R.G.S., Chairman of the Bratsberg Copper Company, and of the Oscar Gold Mining Company.
SAMUEL YORK, Esq., Director of the Bratsberg and of the Oscar Mining Companies.
Captain J. P. DAW, Managing Director in Norway of the Oscar Company, and Manager of the Bratsberg Mines.

BANKERS.

The IMPERIAL BANK (Limited), Lothbury.

COMMISSIONER AT KONGSBERG.

MR. M. RASCH (Many years one of the MANAGERS, and now TREASURER of the GOVERNMENT MINES).

SOLICITORS.

MESSRS. KERLY, SON, AND VERDEN, 14, Great Winchester Street, E.C.

SECRETARY AND OFFICES.

Mr. J. H. A. SMITH, 8, AUSTIN FRIARS, LONDON.

This company is established to acquire a very extensive and valuable property, stated to be about 3½ square miles, known as South Vinoren, or Dronningkollen, comprising 16 silver mines, originally forming a portion of the group of the famous mining undertakings in the Kongsberg district, which have been so successfully carried on by the State of Norway for many years.

According to the Official Records the Government Mines (including those on Dronningkollen) have yielded 884,112 kilogrammes of fine silver, equal to 1,933,995 lbs. avoirdupois, which even at the present lower rates would be worth about £5,801,985, and the profits realised in the 50 years to the end of 1883 have been at least £1,172,743. The real profits are, however, considerably larger, as the returns are subject to a heavy annual charge for pensions and other exceptional burdens, which Mr. Rasch (the treasurer) states to be 25 or 30 per cent. of the net profits; and at the same time the operations are carried on upon a limited scale, and in a somewhat primitive manner.

In the year 1854 Mr. Rasch says it was resolved that 4,000,000 kroners of silver should be extracted beyond the usual quantity, and that the proceeds should be lent to such communes as were in need of funds, and this order was carried out. Again, out of the annual expenditure, he says that no less than 65,075 kroners (£3615) goes to the Municipal Council of Kongsberg (£1245), pensions (£2205) and mining school, &c. (£165); 84 men and 120 women and children receive pensions. Only five days a week are devoted to the works.

With this prospectus is given a full description of the history and prospects of the Dronningkollen Mines by Mr. Rasch (long a manager and now treasurer of the Government Mines), his statements being verified and confirmed by Mr. Langberg (Master of the Royal Mint), and also a report by Captain Plummer, the well-known English authority.

The property is situate about 6½ hours' journey from Christiania, and, therefore, only about three days from England.

Mr. RASCH remarks that the geological characteristics of these mines very much resemble those which the State has continued to work, and that though in the old period the former were not worked much more than a third of the time of the latter, they gave actually a greater output of silver; and he, therefore, predicts for the former as brilliant a success as has attended the mines that have been continued by the Government. He further points out that the profits of the Kongsberg Consolidated Mines would not be subject to the heavy charges for pensions and Municipal payments which the State Mines have to bear.

The following are the names of the principal mines which the company will acquire:—

UBRIKKA (2).
JULIANETRAAB.
JULIANE MARIE.
NORSKE LOVE.
CHRISTIANUS SEXTUS.
DRONNING SOFIE MAGDALENA.
KRONPRINDS FREDNK. I. NORGE.
PRINDSESSE MARIA.
LOVISA.
RAVNAAS.
GLUCKAUF (2).

Capt. DAW (Manager of the Bratsberg Mines), who has examined the property at surface and in the adit levels, writes:—

"Some time ago the Storthing agreed to grant this part of the Kongsberg Mines to capitalists in Norway or to foreigners. Shortly after this law was passed a company was formed by Norwegian gentlemen, with a capital of only a few thousand kroners (Kr. 1000 = £55 11s. 1d.), which was soon spent in building houses and erecting stamps, with a little dressing machinery. They started to drive a level from Christianus Sextus to Norske Love. Had they continued this level, and not put up a rise in the middle of the drivage, they would have come under the Norske Love Mine full 20 fms. If the mines are worked this level must be driven.

"I am informed by the Master of the Royal Mint that this Norske Love is one of the richest of the mines.

"When their few thousand kroners were exhausted they had to suspend operations; but they have done much work for a new company * * * *

"It appeared to me that nearly all the lode (in the adit levels) was taken away up to and nearly to surface; and what surprised me more than anything else was that there are not much rubbish heaps for such extensive workings, plainly showing that nearly all (the lodestuff) has been carted away to be smelted.

"According to the official records of the Ravnaas Mine it yielded 3 4-10 lbs. of pure silver to the square metre, there being 6½ metres to the cubic fathom, which would give in money value over £35 per fathom. This mine, according to my opinion, could soon be unwatered by a cross-cut adit from the side of the mountain, and at very little cost.

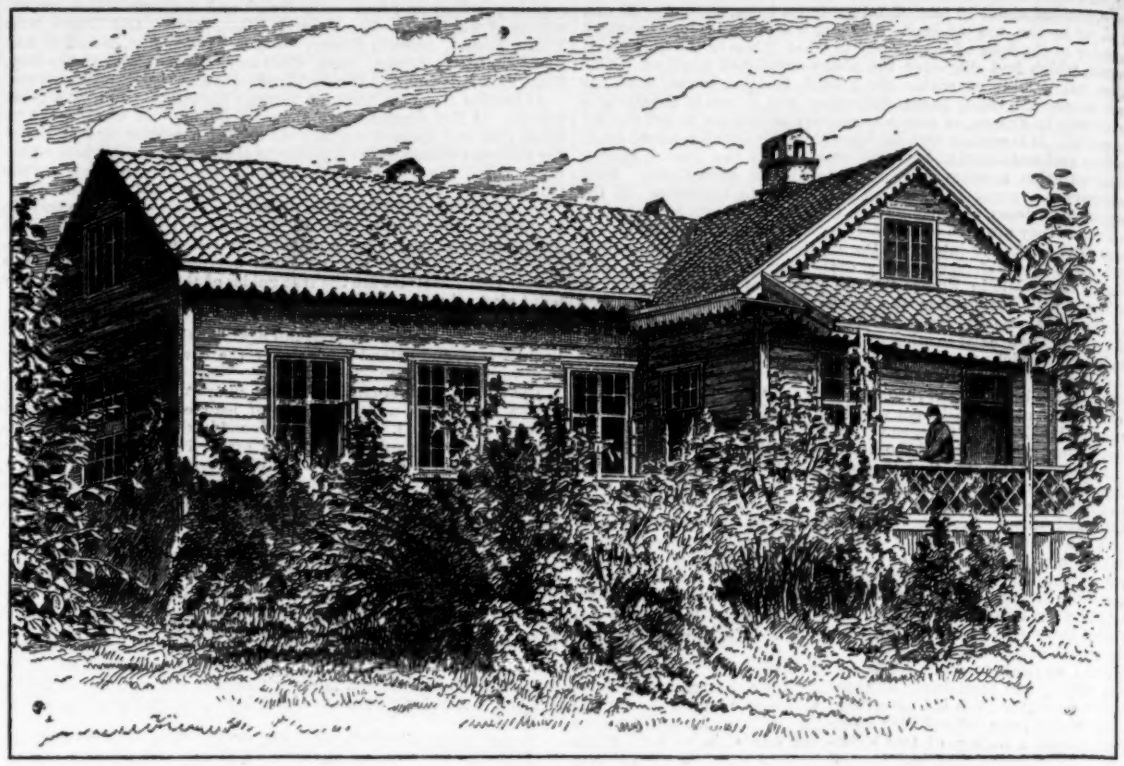
"I was informed by the Master of the Mint that many of the other mines were equally rich; they only wanted capital to open them up."

Capt. PLUMMER states that with the exception of a piece of ground at present reserved by the State, the Dronningskoll property immediately adjoins the Government mines, and the following extracts from his report will show his opinion of its value and prospects:—

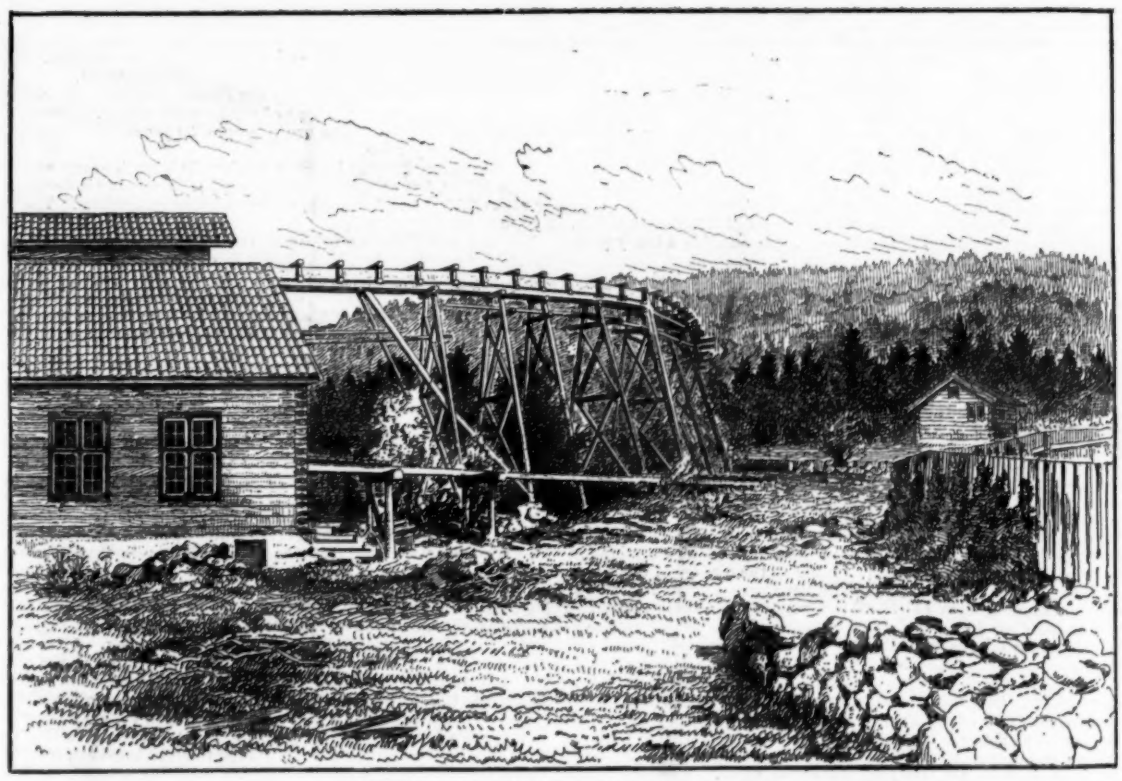
"At Kongsberg I went to the bottom of the State Silver Mines, and from the knowledge I gained, together with the information given to me by the officials there, coupled with the documents you procured for me, I am able to give the following information:—

* * * * * *

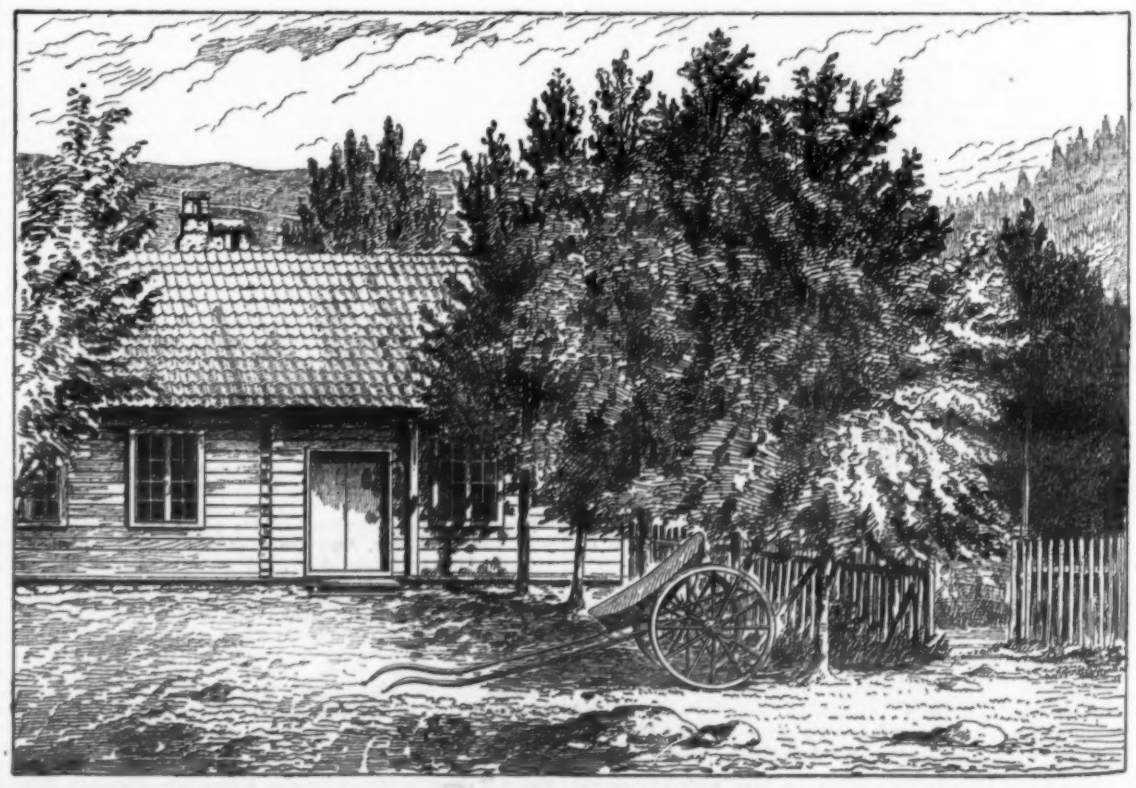
"After an examination of the working plans and sections, I went to the bottom of one of the principal State Mines, and thus made



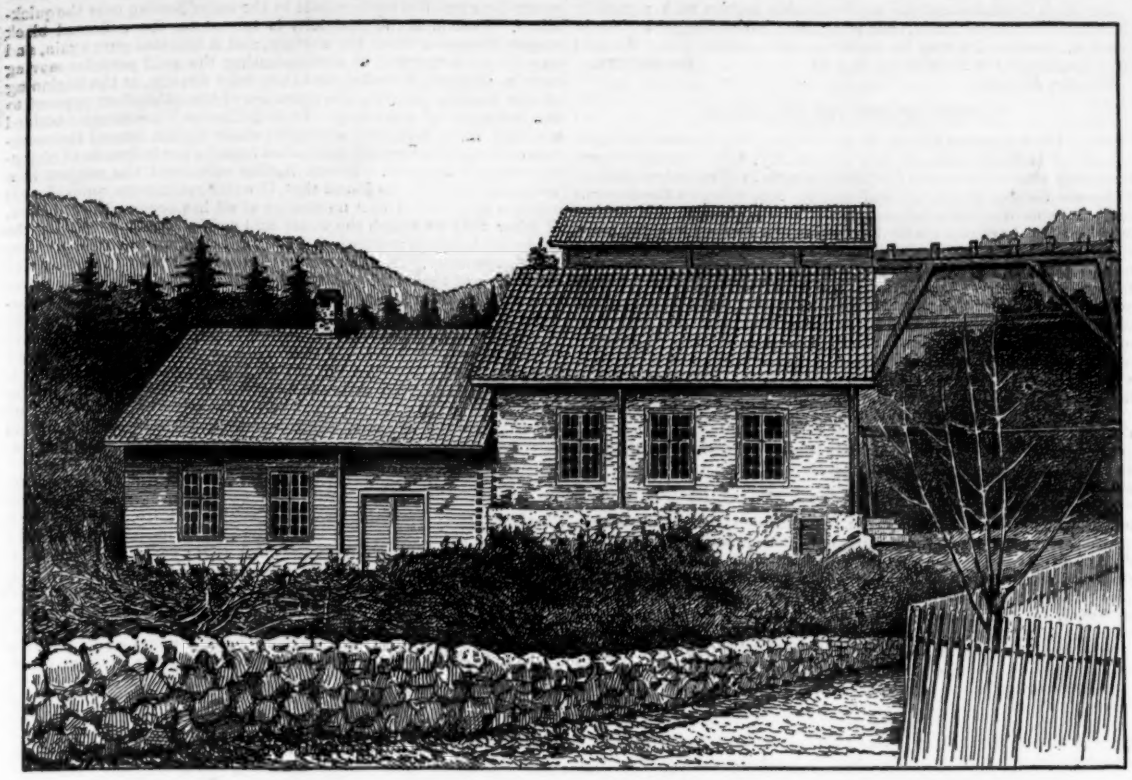
AGENT'S HOUSE.



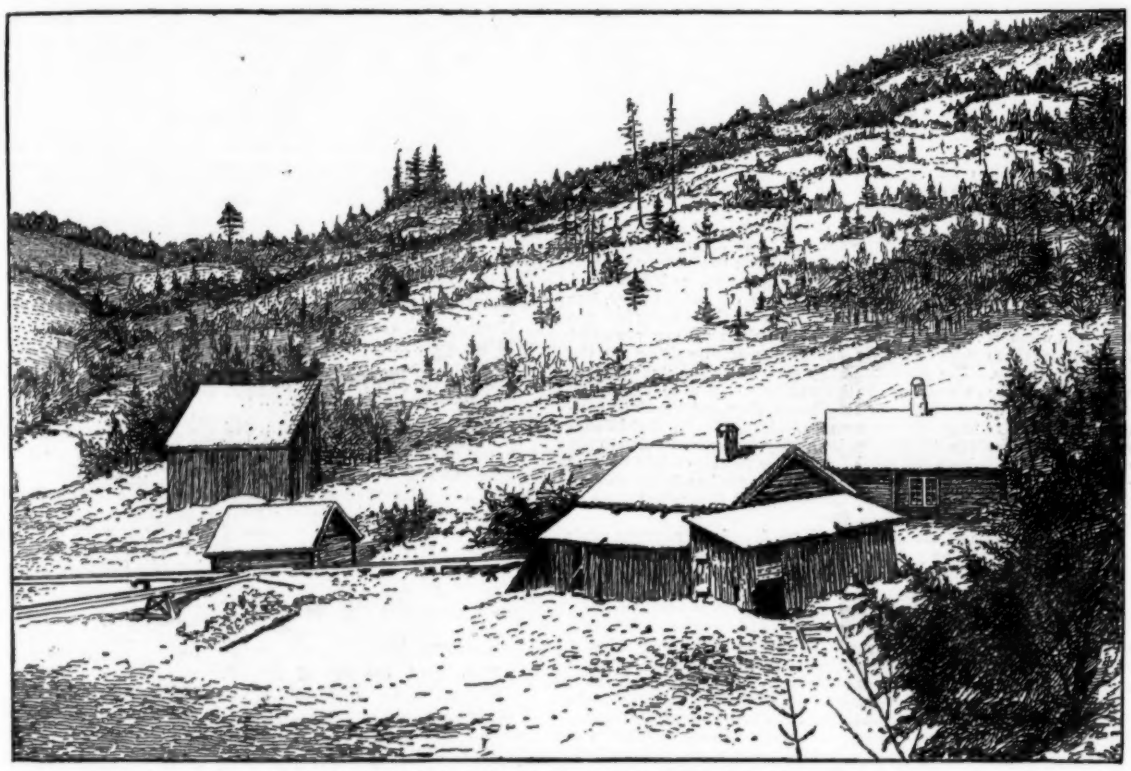
LAUNDERS CONVEYING WATER TO STAMPS



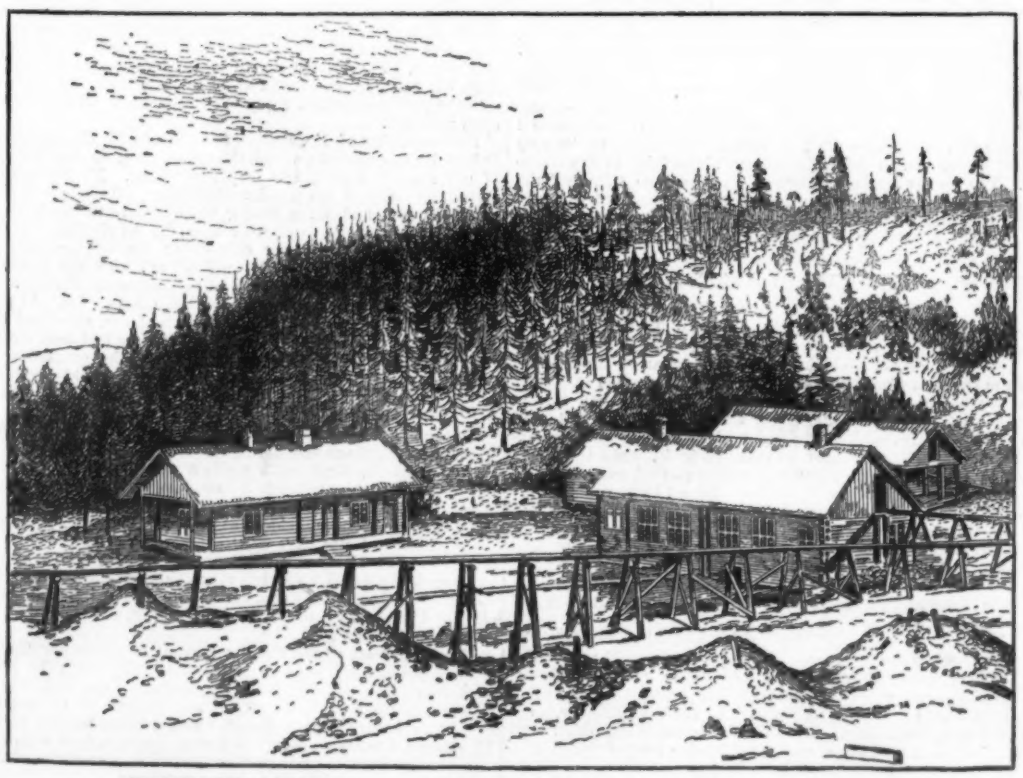
OFFICE AND LABORATORY.



HOUSES CONTAINING WATER-WHEEL, STAMPS, AND GENERAL DRESSING MACHINERY.



DRESSING SHEDS, SMITHY, &c., AT MOUTH OF CROSS-CUT.



WORKMEN'S COTTAGES. DRESSING FLOORS AT MOUTH OF CROSS-CUT

myself acquainted with the character of the rocks, the lodes, and general appearance of the mines, for comparison with the Dronningskoll mines.

"In the bottom of the mine I saw exceedingly rich stone. There were lumps as large as a man could lift, estimated to contain £160 worth of pure silver. I also saw pieces of pure silver of about 2 lbs. weight which were taken from 'vughs' or fissures in the vein. These workings were in a direct line with the properties forming the subject of my report.

"The Dronningskoll Mining Territory has an area of about 3½ square miles, and comprises within its boundaries the greater part of the mines and openings which have been worked by the Government in the Southern Vinoren Silver Field.

* * * * * * *

"I have formed my favourable opinion on what I saw here and at the neighbouring State Mines, and have based my calculations on the accounts and certificates which you procured for me from Mr. Rasch, formerly manager of one of the Government mines, and now cashier at the Royal Mint at Kongsberg. The accuracy of Mr. Rasch's statement is certified by Mr. Langberg, the Mint Master, who was educated as a mining engineer, and who having made special researches in the national archives of the silver works is considered the highest authority on the matter."

* * * * * * *

"With proper supervision and efficient machinery the mines should be worked at much less cost than the State Mines, and, as Mr. Rasch explains, the new company would also be exempt from the tax of 11 per cent. for pensions, &c., now charged against the Government Mines, and I, therefore, think that 1 kilo. would be ample to cover working expenses. I will, however, conduct my calculations on the Government basis—that the expenses will equal 75 per cent. of the returns, and take the latter according to the statements furnished, an average of about 2 kilos. per square metre, or (say) 32 lbs. fine silver per cubic fathom. Thus one-fourth will be the profits—equal 8 lbs. fine silver per cubic fathom at £3 per pound, or £24 sterling as clear profits; it will readily be seen that the amount of profits will be limited by the number of fathoms of vein extracted.

"These calculations are based on the figures contained in the documents you procured for me, and as the mines were all under water (below the adit) at the time of my visit, I had no means of verifying the correctness by actual inspection underground. I saw, however, at the bottom of the State Mines a rich silver lode, and judging from this, as well as from the surface appearances, I am persuaded in my own mind it is a very desirable mining venture.

"To open up and properly develope the above-named mines a fair allowance of time and capital must be made, but at the Ravnaas Mine returns can be almost immediately obtained, which would yield a good profit while the larger operations were in progress. This (Ravnaas) Mine is about 30 fms. deep, and from 650 square metres of lode 1008 kilos. of silver were obtained, an average of 1·55 kilos. per square metre, or (say) £35 per cubic fathom. The former workers were driven out by water which they had not sufficient and proper appliances to cope with. There is now an engine on another part of the sett which could be fixed at Ravnaas, and in a few months' time the works necessary could be completed, as before estimated, at a cost of (say) £3000.

"Labour is abundant. Good miners can be got at a reasonable rate, and the general expenses would not be higher than the ordinary English mine cost. In the valleys below the mines there is said to be ample power to drive powerful hydraulic engines, and I have therefore recommended a turbine for giving motive power and engines driven by compressed air, which will not only save the cost of fuel for steam, but will also afford an efficient and economical method of ventilation.

"Wood is plentiful, and can be cheaply obtained for fuel and mining purposes.

"The mines are within three days' journey of England. From Christiania to Kongsberg there is railway communication, passing on the route, at a distance of 30 miles from Kongsberg, the important shipping port of Drammen. From Kongsberg to the foot of the mountain on which the mines are situated there is a good road; the mountain road will require some repairs, but the cost of these is included in my estimate.

"Carefully considering the prospects of the Dronningskoll property there appears to be the very minimum of speculation. The mines themselves form a portion of the group which have been in successful operation for nearly 250 years.

"I have before stated in the Government mines veins appearing to be the same in character as those proposed to be operated upon in the Dronningskoll mines may be seen, and their productiveness at a depth of 200 fms. guarantees that they are continuous in depth, and offer scope for permanent and profitable exploration.

"A further proof of the profitable nature of the ground is to be found in the fact that the workings have proved remunerative notwithstanding the heavy pensions and numerous disadvantages attendant on State industrial works, and the exceedingly rude manner in which the operations were formerly conducted. I am informed all winding and hauling was done by horse whims and water, and ore was raised to surface in this slow and expensive manner, while underground fire was employed for breaking the rock. Add to this the restrictions which were imposed on the output from the State Mines, and it will be seen what immense advantages a new propriety would have over the old workers.

Lastly, quoting again from Mr. Rasch's notes, in which he clearly demonstrates the lodes in most of these mines to have yielded 2 kilos. of fine silver per square metre in the past working, and assuming the lode to continue as rich in depth they must prove to be fabulously rich mines, and it will appear from Mr. Rasch's figures, taking 2 kilos. of fine silver per square metre, the profits will practically only be limited by the amount of capital devoted to opening up the mines, and adding to the plant from time to time as may be required, and if the work is carried out as I recommend, as far as it is possible to judge in mining matters, I am of opinion that the results cannot but be highly satisfactory and remunerative."

The vendor has handed to the directors certificates of assays of stones and samples stated to be from some of the lodes, signed by Messrs. Johnson and Matthey, which show the following remarkable results:—

	Gold—Ounces.	Silver—Ounces.	
No. 1	1	12,680	Per ton of 20 cwts. of ore.
No. 2	0·150	3,650	
No. 3	Traces	1,080	

Besides the very high percentage of silver, these assays disclose the important fact of the existence of gold to a valuable extent, and this may lead to further discoveries that would greatly enhance the value of the mines.

It will be observed that Capt. Plummer estimates the capital required for supplying adequate machinery and opening the mines properly at £41,500, which includes a reserve of £15,000; but the sum proposed to be raised will provide upwards of £60,000.

No positive statement can be given of the amount of profits to be made; but taking the official records of the large quantity of silver produced from the ground already worked as proving the richness of the lodes—considering the strong and favourable views expressed by the best informed and most competent persons—and bearing in mind the highly remunerative results for many years past of the State Mines of an exactly similar character on the adjoining property, notwithstanding the limited scale on which they are carried on, and the special burdens to which they are subject—Capt. Plummer is amply justified in believing that there is "the very minimum of speculation," and that the lodes, having in the immediate locality continued so rich and profitable to the greatest depth yet reached (300 fms.), "offer scope for permanent and profitable exploration" in the Kongsberg Consolidated Company's property.

The object will be to take in hand, first, several of the mines which can be brought most quickly into a profitable state, and then proceed with others. It might also be desirable hereafter to dispose of some of the rest on terms that would give an advantage to the company.

It may be anticipated that even the first year will give a profit, and the directors confidently believe, with Capt. Plummer, that "the results cannot but be highly satisfactory and remunerative," especially with the improved and efficient machinery that will be adopted.

Two important facts will not escape notice—that Mr. Rasch, one of the principal officials of the Government Mines, has consented to give his valuable assistance to this company; and, secondly, that the properties are within so near and easy a distance of England.

Many of the statements set forth in this prospectus cannot possibly be within the personal knowledge of the directors, but they have taken the greatest care to verify them by reference to official and other authorities on which they can place reliance, and they believe such statements are entirely correct.

The purchase money will be £55,000, of which £35,000 will be taken in paid-up shares. The balance of £20,000 has to be paid in cash by instalments spread over 12 months.

It will be observed that Mr. John Henry Murchison, the vendor, is a director of the company.

The only agreements entered into are one dated April 21, 1884, between M. J. Frog and Anton Bommen of the one part, and John Henry Murchison of the other part. The other dated May 31, 1884, between the said John Henry Murchison of the one part, and John Henry Augustus Smith as trustee for the company of the other part, which said agreements, together with the Articles of Association, can be inspected at the company's office, and applicants for shares will be taken to have notice of the contents thereof.

Application will in due course be made to the committee of the Stock Exchange for an official quotation of the shares.

Prospectuses, with copies of Mr. Rasch's and Capt. Plummer's reports, and views of the buildings, surface plant, &c., can be obtained at the offices, 8, Austin Friars, London, E.C.; and also at the Imperial Bank (Limited), Lothbury, E.C., and their branches, Westminster Chambers, Victoria Street, S.W., and Fulham Road, S.W.

Original Correspondence.

CANADIAN MINING, RAILWAY, AND GENERAL INTELLIGENCE.

SIR,—The meeting of the Grand Trunk Railway shareholders in London and the speeches of Sir Henry Tyler have engaged some attention in Canada. I can do no better than transcribe the words of the Monetary Times of this city.

Complaint was made that the Canadian Government had assisted the C.P.R. to build roads competing with the Grand Trunk. There is, however, only a modicum of truth in this. Towards the Ontario and Quebec Railway the Government gives nothing. $6000 a mile is reserved to aid in building a line to run parallel with the North Shore road, but the Grand Trunk brought this on itself by buying up the North Shore Railway, for which it had no need. Its object must have been to block the C.P.R. at Montreal; but if the country found it necessary to build a railway to the Pacific this road must also find a way to the Atlantic. When all the circumstances are fairly weighed we do not think the Grand Trunk has much to complain of, and its own conduct in opposing itself with extreme violence to the policy of the Government in constructing this national railway compelled the Government to act on the defensive.

The mode of warfare carried on by the Grand Trunk against the Canadian Pacific, in England, passed the bounds of legitimate criticism. It was violent, disreputable, and dishonest. Sir Henry Tyler has small reason to complain if the parties on whom these blows fell struck back in self-defence. The Grand Trunk threatened to ruin the credit of Canada, which it could not even seriously damage; but it could, and did, materially injure the Canadian Pacific, and this gave the Government an excuse for coming to the aid of the latter company with a loan of $30,000,000. The Grand Trunk set the example of defiance, and, as might have been expected, got beaten at its own game.

The fact of it is, the Grand Trunk made a serious mistake in not building right through to the Pacific themselves. For four or five years they had the opportunity, and Mr. McKenzie spent $10,000 in advertising for somebody to build the road before the present syndicate was formed. The offers of land and money in aid of the road were larger than the present syndicate built it on. If they had taken the land and money and built the road, and let the Great Western and its branches alone, they would have had something like a Grand Trunk Railway of Canada.

Our present provinces of Ontario, Quebec, New Brunswick, and Nova Scotia are the smallest part of Canada. The Canada of the future is between Winnipeg and the Rocky Mountains.

Reciprocity.—A movement is looking toward reciprocity with the United States, but Canadians cannot make advances. We hold ourselves in readiness to discuss any feasible plan, but after the way Canada has been snubbed by the United States with regard to reciprocity, we shall let them work out their own salvation. The Morrison tariff, a step towards free trade, has been rejected, but only by a majority of four. Yet the Democrats who are on that platform and are making earnest efforts to reduce the tariff are likely yet to succeed. That a high war tariff should exist at the present time in the States, when they have such a surplus they do not know what to do with the money seems absurd. The Mantinny Times says, "There are signs of an earnest movement in the country against a high protectionist tariff. Among them is noticeable the formation of a Tariff Reform League, at Boston, which comprises names of great weight and influence. It would not be surprising if an agitation such as that which ultimately overthrew slavery should henceforth be carried on, in the interest of free trade. The fight, should it commence in earnest, will be fierce and perhaps long. The doubt whether protection always protects is beginning to have some influence. And the free trade orators are showing the weak points of protection and wherein it is injurious to the manufacturer."

The Anglo-Saxon Conference on Trade.—In these days of conference and discussion, what is required is a conference of all using the English language, in order that we may have a tariff of our own. The children of England are now new nations, but they all speak the mother tongue. How far a conference of representatives of England, India, Australia, New Zealand, the United States, and Canada would come towards an agreement, cannot be known, but that such a conference would be of benefit no one who reflects can doubt. If some of your large towns like Birmingham and Manchester, and in fact all interested in the export trade, would hold meetings, and then have meetings in all the colonies, and form an association for that object, the United States might be induced to send representatives also.

COLGANY AND THE ROCKY MOUNTAINS.—All the news from the Rocky Mountains is in confirmation of progress. Miners are coming in from Montana, and already there are several mining camps throughout the mountains as the time progresses. What with mining in the mountains, large finds of gold and silver, ranching on the plains, large herds of cattle, a fertile land, and a salubrious climate (not as cold as the Province of Quebec), there is little doubt that the new territory between the United States and the Peace River on the eastern side of the Rocky Mountains will be of immense value. It will be the Devonshire of Canada, without the ocean. Perhaps you, who are dwellers in the "tight little isle," will think that would be like the play of Hamlet with Hamlet left out. But the whole Anglo-Saxon race cannot live in England. That would be a "tight" place then, and no mistake. Therefore if they must move, if they must emigrate, no other place offers the same inducements as Canada. Only 14 days between Liverpool and Colgany! Land in abundance; cattle, and all the requisites of a new country. But people who come need not expect not to have to endure some hardships, yet they will be as nothing now compared with what the old settlers of old Canada had to endure. You cannot get anything for nothing, and it is far better to leave the old country and start out in a new than to moulder on in amid competition and poverty. Whatever riches of gold and silver may be found, yet I am of opinion that the history of Australia will be repeated in the land between Edmonton and the boundary line. In Australia the money was made cheaply (that is, the money that stuck) in sheep-farming, and this land has all the facilities for sheep-farming, with the advantage of comparative proximity to Liverpool as compared with Australia. When the Hudson's Bay Railway is finished the inhabitants of Manitoba will be as near Liverpool in point of time as the inhabitants of Montreal. They will be in a great measure free from the deplorable accidents like that of the Florida. Collisions will be less numerous as the route between Liverpool and Port Churchill will be less travelled on. To be sure they will have icebergs, but they are to be found on the present route of travel. To the Eastern traveller, he who wishes to make a quick journey between Liverpool and Japan, no other route appears to combine so many advantages. Liverpool to Port Churchill, Port Churchill to Port Moody, British Columbia, Port Moody to Yokohama.

The Cilician wool, made from the Cilician goat may perhaps be introduced into our American plains with profit. We read in Franz Delitzsch, D.D., lectures "On Jewish Artizan Life in the time of Jesus," as follows:—"It is therefore quite in accordance with the customs of the times, when Saul of Tarsus in Cilicia, afterward the Apostle, although he had chosen learning as his profession, for which purpose he went to Jerusalem, the metropolis of national learning, also understood a trade. Like Aquila of Pontus, with whom he became acquainted at Corinth, he was a tent-maker—not a maker of tents, but of tent-cloth. Tarsus lay in a fertile plain, watered by the Cydrus, and very favourable to cattle breeding, and Cicilian wool was one of the most favourite materials of which cloth for covering the framework of tents was manufactured. To this day the tent-cloth of the wandering tribes of Arabia is chiefly made of goats' hair." Perhaps some of your readers may know something about the Cilician wool or hair, and the characteristics of the animal from which it is obtained. If so, it would perhaps be of great benefit for it to be mentioned in the *Journal*, for if the sheep or goat will thrive at Colgany, a new industry may be opened for Canada.

Our High Commissioner did such valuable service with regard to the Canadian Cattle Trade, that when Sir Charles Tupper arrives in London, his attention may be drawn to this question also. He sails from Quebec on the Parisian on May 24. BOURONITE.

Toronto, May 12.

UNITED STATES OF COLOMBIA.

SIR,—There are nine States in the Union, and in every one gold and silver is found more or less abundantly, but three shine pre-eminently above the others for their richness in the precious metals. These are Tolima, Antioquia, and Cauca. According to the Government Returns there were shipped $2,885,573—65 per cent., 577,112*l.*—in gold, silver bars, and specie during the year ending Aug. 30, 1883, and as this sum does not include anything from the State of Cauca, or for the gold dust taken away by private individuals who may be travelling to Europe or America, and prefer this somewhat unwieldy process to paying 20 per cent. premium for bills, nor does it include the silver ore shipped by the Tolima Company, but is simply the result of the mining operations of perhaps a dozen foreign companies, and what the natives extract by streaming (principally), and a few mills with stamps of the old Cornish type, surely a proof that the Spaniards did not take all there was.

I will now take the State of Tolima as being the one in which are situted the mines of Organos, Tolima, North Tolima, Malpaso (Colombian Hydraulic), Orita, &c., and, therefore, I presume the one about which people are at present interested. Commencing at the extreme south of the State, where the Magdalena takes its rise in the Paramo del Buei, and begins its course of upwards of 1000 miles to the Atlantic, 800 of which are navigated by steamers, auriferous gravel is not seen in any quantity until the junction of the River Paez above Carnicerias, although gold has been washed out of the stream of Gigdute, where the road leading to the Pass of the Guanacas crosses the river by means of a ferry, and runs through the village of La Plata. This village of La Plata is built some distance from the old town of San Sebastian de la Plata, which was destroyed by the Pijao Indians in the year 1538, according to tradition, in order to avenge some cruelty perpetrated on an Indian girl, but more probably it was a determined attempt of the still unconquered tribes to throw off the hated Spanish yoke; at any rate, they effectually destroyed this town, massacreing the inhabitants, razing it to the ground, so that now the explorer must look for its ashes under 18 in. of vegetable soil, and in the shadow of great forest trees, such is the luxuriance of tropical vegetation, and the rapidity with which soil is formed obliterating all traces of the past.

La Plata owed its importance to the proximity of the celebrated silver mines, which were granted to the conqueror Belalcazar as a reward for his passage from Peru to the plains of Bogota, after fighting numerous battles with the warlike Indians of the south of Tolimo. These mines were surrounded by the same army of Indians who afterwards destroyed the town, and not a single Spaniard or domesticated Indian were allowed to escape, so that no alarm could be given; the unfortunate men being seized, and forced inside the levels, which were then filled up with earth, and every vestige of the mine, buildings, machinery, &c., totally destroyed, and in so effectual a manner that they have never been rediscovered to this day, although expeditions have been formed for that purpose, but probably have only gone to work in a superficial manner. A short time before I was there, by means of searching in the stream until quartz became abundant, and then looking for what seemed by its sunken appearance to be the mouth of a level, some relics of the past were unearthed, as about 10 yards in were found the skeletons of three men, which crumbled away as soon as the air entered, but one, evidently a soldier, had a broad leathern belt with a large brass buckle, which remained intact. I am strongly of the opinion that at a comparatively small cost these mines could be rediscovered, as it is natural to suppose one of the three great conquerors of the country, like Belalcazar, would not take as his share of the spoil anything but the best, and when it is remembered that these mines were only worked for 26 years there must surely be enormous wealth waiting for the next adventurers. The great difficulty would be the distance which all machinery, &c., would have to be transported, first to Honda by steamer, about 550 miles up the Magdalena, then by the short connecting line of railway to the steamers of the Upper Magdalena, which would carry it to Purificacion in the dry season and Neiva in the wet, a distance of about 220 miles. From there carts might be used as far as Hobo, 27 miles, and by improving the road as far as the ford of the Magdalena at Carnicerias, 30 miles, and thence by mules to La Plata, 12 miles distant.

On the hacienda of La Guandiorosa are found the next attempts at gold washing, but only on a small scale; proceeding northwards we come to Hobo, where some 30 years ago quite a little rush took place, as a good deal of gold was obtained by means of washing with the batea, or pan. The gravel here is about 400 ft. above the level of the river, and the richest streaks are on layers of sandstone, forming false bedrocks. The gravel is somewhat indurated, but a company with capital sufficient to bring on water for hydraulic machines should do well. Auriferous gravel is found rather above Neiva, on either side of the river, there being washings at Yaguara, on the west, and Campo-alegre on the east; but from here onwards all the deposits are found on the foot-hills and plains of the central range of the Andes, whose volcanic and metamorphosed rocks, traversed by innumerable lodes, tend by their disintegration, if only in a small degree, to replace the wealth which has already been extracted from the streams. The town of Aipe is 20 miles below Neiva, and here the road branches off which leads to Organos. After traversing the ridge of the chiflon, which is composed of the hardest gravel, and is 6000 ft. above sea level, one sees the valley in which is situated the village of Organos, where formerly the Jesuits had a mission. Under the Spanish rule these Indians, as well as their neighbours of Natagá, had to pay their tribute entirely in gold dust, which was found abundantly in the river. The mine of Organos is some distance from the village; the levels are 600 ft. perpendicularly above the river, and at the point where the mill is situated there is sufficient water-power to drive a great number of stamps. It is a good many years since I was there, and the changes effected by the company must be very great, and under Mr. Green's management, beneficial to the shareholders. The former workers appeared only to have taken off the back of one lode by means of an open cut, and extracted the gold from the rich gossan that assays as high as 40 ozs. to the ton by grinding and then washing in bateas. H. J. C. WILLIAMS.

Paignton, June 4.

TREATMENT OF GOLD ORES BY ELECTRICITY—BARKER'S PATENT.

SIR,—It is well known, says the Chemiker und Techniker Zeitung (Vienna), May 17, in an article headed "Amalgamation von Golderzen mit Zuhilfenahme der Elektricität," that to separate the precious metal from the quartz containing gold, it must be crushed in stamps and then washed in a water channel over a surface of quicksilver. In consequence of the strong attraction which quicksilver and gold possess for each other, each particle of gold will, as soon as it comes into contact with the quicksilver, be retained by it, while the pieces of quartz will float on through the water and be carried away. Besides gold there are other substances which are retained by the quicksilver, such as oxygen, sulphur, arsenic, &c., of which several, if not all, appear in certain mines with the gold. If such ore flows over the mercury there remains besides the gold these foreign substances, which being lighter than the mercury remain on the surface, and when united with the quicksilver form a tough mass, which can only be removed by a strong current of water, by which gold and mercury are also swept away.

The American miners call this "sickening," that is when the quicksilver becomes dull in consequence of the aforesaid substances uniting with it, so that it cannot come into contact with all the gold, a part of which is then washed away by the water. Hitherto this has been prevented by replacing the dull by fresh quicksilver, purifying the first by distillation. But this adds to expenses, which even with the greatest care swallow up a considerable part of the gain.

A short time ago Mr. Barker discovered a process by which quicksilver can be preserved from this "sickening"—by using an electric battery or dynamo machine and applying the negative pole to the quicksilver and the positive pole to the water flowing over the quicksilver. As soon as the electricity is turned on the collected black masses disappear from the surface, and it becomes pure again, and capable of attracting or amalgamating the gold particles moving over it. Gerboni, Herschel, and Davy have already, at the beginning of this century, observed the retention of the quicksilver opposed to the influence of electricity. In 1875 Charles Wheatstone obtained a patent for a telegraph apparatus whose signals formed the movements of a quicksilver column called forth by the influence of changing electric currents. Robert Sabine submitted the subject to a searching enquiry; he found that, if water reaches the quicksilver it oxidises it, provided that no change at all has occurred to it before. If after that we attach the water and quicksilver to a battery, the oxidation becomes reduced, and the surface of the mercury receives a metallic purity, and if the electric current be strong enough a quick movement of the metal is observable. If we pour a little quicksilver into a small basin full of water, so that the column of water is separated into two parts, and let an electric current pass through the channel, the one side of the quicksilver will be oxidised, the other will be deoxidised. If we apply these facts to the Barker electro-amalgamator it is clear that on the surface an uninterrupted electric process goes on, whose action is simply to deoxidise if there is water only. But if the minerals which cause the soiling of the surface are present then the action of the electric current consists in this, that it prevents the soiling of the quicksilver by such substances as already mentioned.

It is not yet determined what causes the sickening of quicksilver. However, we can with probability take sulphur and arsenic as the chief causes. According to their chemical affinity, these elements would unite with mercury; but if the electric current acts on them their electro-negative nature prevents that; consequently they, as well as the ground quartz, are carried away by the water.

The Electro Amalgamation Company exhibited an apparatus with the aforesaid aim in London. On inclined tables, 6 ft. broad, were separate spaces filled with quicksilver, the feet of which were covered by copper, and were united to one pole of a dynamo machine. Over the quicksilver, at the height of about 6 in., was another copper plate joined to the other pole. The current of water brought the crushed ore on to the table between the quicksilver and the copper plate. The pulverised mineral was carried away by the water, while the gold remained with the quicksilver.

In Colorado this is sometimes the difficulty that gold is often rusty—that is to say, it is covered by a coating of sulphur. Such gold will not amalgamate through the pure surface of the quicksilver. At present these ores are smelted, by which process the expense of obtaining the gold, compared to the amalgamation, has come to be disproportionately high as $1½ to $15. The Electro Amalgamation Company thinks that the Barker treatment would do for rusty ores also. For this reason they are getting such ores from Colorado in order to make trials with them.

The method awakens the greatest confidence, and we read with pleasure in the October number 275 and 281 of the Nemzet and the Pest Lloyd, that they have commenced investigations with us also. Experiments were carried through nominally with very satisfactory results by Chev. Henri Mayne (late conductor of the electric arrangements of the Designolle process in Nagybanya. At least, according to the announcements of the Pest Lloyd, from 1 ton of ores from Kapnibanya which contained 630 grammes of gold and silver, 23 per cent. of zinc (perhaps sulphide of zinc) and 10½ per cent. of lead (lead sulphide), 510 grammes of gold and silver were obtained, so that only 120 grammes were lost.

From another source we take the following figures, which likewise cover the Budapest experiments. In these only the precious metals are given:—

	Contents of 1 ton before.	After Amalgamation.
Kreutzberg silver ore	S. 680 grs.	430 grs.
	G. 9·5	3·8
Kreutzberg silver ore	S. 500	135
Boitza ore	S. 530	90
	G. 48	10
Kapnik rough powdered and washed ore	S. 950	700
Zalathna foundry dross	S. 50	30
	G. 5·7	1·2
Zalathna foundry dross	S. 60	Traces
Zalantha foundry dross	G. 2	Traces

But in opposition to these undoubtedly favourable results we have some unfavourable, which in the interest of truth we cannot omit. These were obtained in the presence of the Government Delegate-Councillor of Mines, Mr. Max Reitzner.

The value of the ore was tested by the Schemnitz Chemical Laboratory, before as well as after the experiment, and they were also analysed, the results were the following:—

	In 1 ton before	After amal.
Kreutzberg silver ore	S. 720 grs.	530 grs.
	G. 1·2)	1·20
Rough gold ore out of the Felso-Banya	S. 200	200
	G. 25·30	25·30
Rough silver ore from Kapnik	S. 920	920
	G. 0·50	0·40
Zalathna foundry dross	S. 80	80
	G. 7·80	7·60

Chev. Mayne writes in explanation of the results that they were caused partly by the bad quality of the ore, and partly by the small quantity which was tested; and, lastly, on account of the bad arrangements of the battery. However, the business is much too new and the working much too little-known about for us to go into the different results, or even into the treatment. So much, however, stands without doubt, that the amalgamation of gold and silver from their ores is the more perfect and easy the purer the surface of the quicksilver. The electro-amalgamator may certainly work favourably, but how far, and under what circumstances, it is able to separate the precious metals from their ores, we must still consider an open question.

The researches of Mr. Robert Schelle, Royal Hungarian analyist (which he has carried on with the finest possible powdered ore, out of the Franz's shaft), are very interesting. Mr. Schelle mixed a certain quantity of ore powder with water, put it into an ordinary porcelain dish and let a strong electric current work on it, and indeed he poured the quicksilver into the bowl first, and then on that he poured the water containing the ore powder; he connected the zinc pole of an 18 cell battery with the quicksilver at the foot of the dish, and the carbon pole with the water flowing over the quicksilver, and containing the ore powder. At the introduction of the electric current the pieces of ore, separated from the mass of mineral, were carried away as if they had been caught by a jet of water going from the positive pole. The quicksilver at this pole was then seen quite clear, but the motion quickly ceased as soon as the connecting wire was still, but began again as it was carried over the quicksilver.

As the result of this experiment was not conclusive, as the water with the crushed ore was not in continuous motion as in the Budapest experiments, Mr. Schelle made a second experiment. The new apparatus or amalgamator had five glass tubes, each 26 centimetres long and 2½ centimetres wide, placed under each other in a somewhat bent position, and closed at both ends by cork stoppers.

He filled the lower part of the lying tube with quicksilver and 5 min. he placed over it a copper plate 1½ centimetres broad. The tubes communicated with each other through the end of each tube by a glass funnel placed in a vertical position, whose thin bent tube, sloping downwards through the cork stopper, was conducted over the quicksilver in each tube.

The tubes were placed under one another in a way so that the full tube of the one reached into the funnel of the next; the water filled with ore powder put into the first glass tube went from that through to the second, then to the third and fourth, till at length it was caught in a larger glass vessel. The electric battery consisted of 18 Bunsen freshly amalgamated with concentrated saltpetre acid. The positive pole was attached to the five copper plates of the amalgamator, the negative pole to the quicksilver.

The experiment with finely-ground ore from the Franz's shaft

lasted fully three hours. The result was as follows:—The ore powder contained originally 980 grammes of gold (containing silver), and after the amalgamation 854 grammes. In order to test the working of the electric current more precisely Mr. Schelle made at the same time a second experiment (also with Franz's shaft ore) with a like quantity of quicksilver, as at the first experiment, but without applying the electric current; and he then tested the ore powder with the following results:—The ore powder originally contained, as above, 980 grammes of gold (with silver), and after the experiment 800 grammes—a better result than with the electro-amalgamator. These results do not show the treatment by the electro-amalgamator in obtaining gold and silver from the quartz in a very favourable light.—*London, June* 4. TRANSLATOR.

GOLD IN WALES—No. XLIV.

Gwynfynydd (300 acres) at its highest point, where the principa lodes are, has an elevation of about 1000 ft. above the sea level. It is bounded on the east by Moel Gwynfynydd (1200 ft.) On the west and north by the River Cain, on the opposite side of which and adjoining it, is the Tyddynglwadis Mine. On the south by the River Mawddach, on the opposite side of which is the Cwmheisian Mine. Near the confluence of the rivers the Gwynfynydd Gold Mill is situate just between the Cain and Mawddach waterfalls.

That eminent geologist, Sir Roderic Murchison, Bart., years ago predicted with logical certainty that gold would be found most abundantly at or near the junction of the ancient cambrian and silurian formations; and it is not a little remarkable that, commencing at the Cain Waterfall, the actual junction of these rocks is traceable northwards and midway through the whole length of this mountain, attended by the usual bands of porphyritic greenstone of the Geological Survey, precisely the conditions of Murchison's prophecy, as proved since then almost universally.

The cambrian rocks occupy the western portion of the mountain, and the silurian incline southward to the River Mawddach. A grand geological fault runs across the property north and south, going by the farm house to near what is called the West Cwmheisian Mine, by the Mawddach. The big lode and another or two seem to have been thrown by this fault fully ¼ mile southward. Westward, however, of the fault the value of the situation is determinable with an exactitude at once apparent. Judging from the number of lodes I opened upon and tested a few years ago on the Tyddynglwadis side of the River Cain more lodes must eventually be discovered on the Gwynfynydd side than have at present been surveyed. There are now about a dozen lodes cropping out at the surface, eight of which have been proved auriferous. They are all about ½ mile long, of a mixed mineralogical character, and varying in width from 3 to 66 ft. The lodes run in the usual general direction of east and west with the exception of two (Collett and Doubt-me-not), which are distinctly north-east and south-west. Taking the lodes in ascending order from south to north we have:—

1.—The Cwmheisian gold lode, which holds gold associated chiefly with galena, blende, rhodonite, and some pyrites. An adit has been commenced near the Mawddach Fall to intersect this lode.

2.—The Collett lode has quartz associated variously with blende, galena, copper and iron pyrites, with free and latent gold, some of it in an extreme state of fineness. This lode has been quarried somewhat at surface, and there is reason to believe a good deal of gold obtained therefrom.

3.—The Doubt-me-not lode has about the same characteristics as the Collett lode, which has also been rudely opened on, and gold taken out in fair quantity.

4.—James's lode is of similar character; it was discovered last autumn, and opened a length of 63 ft. by 10 ft. deep, with satisfactory gold results, which fully warrant the driving of a level under it.

5.—Harvey's lode is composed mainly of quartz and blende, some of which is highly ferruginous. Along the course of the lode visible gold has been recently discovered.

6.—The Bridge lode has similar characteristics; is auriferous, but little has been done on it.

7.—The Chidlaw lode (12 to 40 ft. wide) differs very little in character from the other lodes, except that hitherto gold has been more abundant and more work has been done upon it. A very rich shoot of gold was discovered here some time ago, and found to be holding down; in consequence of which two short levels were started for getting under it, neither of which went far enough by a few fathoms. About 14 years ago some 750 tons of lodestuff were quarried, chiefly from this lode I am told, treated at the works with inefficient machinery, and nearly 200 ozs. of gold obtained therefrom. The late manager states that the pyrites holding ¾ oz. to 2 ozs. of gold to the ton was not dealt with at all. This is probably the fact, for two or three years ago I obtained gold at that rate from the concentrated pyrites by my own plan of amalgamation. The company collapsed suddenly, owing mainly to the almost simultaneous death of several of the chief members, and the refractory nature of the lodestuff.

8.—The Middle lode at present has no particular attraction.

9.—The Big lode, or Great Gwynfynydd, is specially attractive, owing to its width of 66 ft., and length of about three-quarters of a mile, and its elevation (1000 ft.). A mass of quartz, holding literally millions of tons. This quartz has been proved generally auriferous, though poor at present at surface in comparison with some of the other parallel lodes. Scarcely any work has been done upon the lode, it being obviously thought more economical to work it when desirable, by an adit driven into the side of the mountain from the southward. Just on the eastern side of the great fault referred to, the "throw" of the Big lode has not been accurately determined. This much, however, is certain, that its presence is seen in the Mawddach river at what is called the Cwmheisian East Mine, where is a junction of lodes 40 to 50 ft. wide, which formerly yielded gold in association with galena, pyrites, &c. Practically, there exists at Gwynfynydd "any quantity" of workable auriferous mineral; some of which is, perhaps, unsurpassed for richness. It is, too, an important economic fact that the whole of these lodes can be intersected at any depth by, and worked dry from, adits driven into the eastern side of the mountain, and if wished from the western side as well. Another fact, of even greater value, is that the waterfalls Pistyll-y-Cain (125 ft.) and Rhiadr Mawddach (85 ft.), as well as the two rivers, are continuously available for the cheapest possible motive power, and for the necessary reduction works, electric lighting, &c.

During the past three or four years in order to ascertain approximately the value in bulk (often highly arsenical) of the lodestuff, as well as the possibility of rejecting with something like safety the least valuable portions thereof, I have made 78 trials of it, good, bad, and indifferent, nearly all but them by my own plan of amalgamation. The following are the gold results arranged in the order of their value, Those marked with an asterisk were small quantities varying from 1 oz. to 14 ozs. The remainder from quantities varying from 3½ lbs. to 10 tons. Gold results—5·6 grs.; 1 dwt. 1·4 gr.; 2 dwts. 20 grs.; 3 dwts. 0·7 gr.; 3 dwts. 8 grs.; 4 dwts. 0·3 grs.; 4 dwts. 5 grs.; 5 dwts.; 5 dwts. 7 grs.; 5 dwts. 11 grs.; 5 dwts. 21·6 grs.; 7 dwts. 23 grs.; 8 dwts. 14·5 grs.; 8 dwts. 23 grs.; 9 dwts. 9 grs.; 9 dwts. 14 grs.; 9 dwts. 15 grs.; 10 dwts. 18 grs.; 10 dwts. 20 grs.; 11 dwts. 17 grs.; 14 dwts. 8 grs.; 14 dwts. 15 grs.; 15 dwts. 14·4 grs.; 17 dwts.; 17 dwts. 4·5 grs.; 18 dwts. 18 grs.; 19 dwts. 16 grs.; 1 oz. 3 dwts. 5 grs.; 1 oz. 4 dwts. 21 grs.; 1 oz. 5 dwts. 8 grs.; 1 oz. 14 dwts.; 1 oz. 14 dwts. 23 grs.; 1 oz. 15 dwts. 2 grs.; 1 oz. 19 dwts. 6 grs.; 2 ozs.; 2 ozs. 3 dwts. 18 grs.; 2 ozs. 5 dwts.; 2 ozs. 11 dwts. 3 grs.; 2 ozs. 12 dwts. 9 grs.; 2 ozs. 12 dwts. 20 grs.; 2 ozs. 14 dwts. 8 grs.; 3 ozs. 1 dwt. 8 grs.; 3 ozs. 18 dwts.; 4 ozs.; 4 ozs. 13 dwts. 20 grs.; 6 ozs. 13 dwts. 18 grs.; 8 ozs. 16 dwts. 9 grs.; 9 ozs.; 9 ozs. 9 dwts. 2 grs.; 11 ozs. 2½ dwts.; 11 ozs. 17½ dwts.; 12 ozs. 19 dwts. 5 grs.; 13 ozs. 8 dwts. 1 gr.; 15 ozs.; 16 ozs. 16 dwts.; 21 ozs. 13 dwts. 13 grs. 30 ozs. 11½ dwts.; 49 ozs. 15 dwts. 20 grs.; 54 ozs. 16 dwts. 16 grs.; 56 ozs.; 57½ ozs.; 62 ozs. 14½ dwts.; 75 ozs. 5 dwts. 13 grs.; 83 ozs. 16 dwts. 16 grs.*; 276 ozs. 18 dwts. 10 grs.*; 493 ozs. 6 dwts.; 938 ozs.*; 1550 ozs. 15 dwts. 6 grs.; 1555 ozs. 11½ dwts.; 5780 ozs. 16 dwts. 4 grs.*; 7732 ozs.*; 9109 ozs. 6 dwts. 16 grs.*; 17,920 ozs.*; 22,000 ozs.*; 35,040 ozs.* to the ton of 20 cwts. The average gold yield was over 31 dwts. to the ton; and in placing this upon record I would remark that there really is nothing exceptional in the results, for at the Clogau Mine out of the St. David's lode was taken 8186 ozs. from 1260 tons of lodestuff. Of still more importance than this, perhaps, are the authentic records of 12,137 tons of lodestuff having been treated by amalgamation in five localities of this auriferous district, which gave a gold result of 14,667 ozs., being an average yield of 1¼ oz. to the ton. Those marked * are referred to in "Gold in Wales," No. XXX., in *Mining Journal*. Satisfied with the recent results at Gwynfynydd of my plan of dealing with minerals that are generally antagonistic to amalgamation, additional plant is about to be erected, and continuous operations carried on forthwith. T. A. READWIN, F.G.S.

London, June 3.

SIMULTANEOUS BLASTING IN MINES WITHOUT ELECTRICITY.

SIR,—I have been much interested in the article which appeared in the *Mining Journal* of May 24 on this subject, and as I am practically unacquainted with the instantaneous fuse and igniters of Messrs. Bickford, Smith, and Co., I shall be glad if any of your readers, who have used them, can enlighten me on the following points:—1. How many charges can be fired at one time?—2. Are the igniters securely attached to the fuse, and if they become separated, can they be refixed by the ordinary working miner, or do they require technical skill or special appliances?—3. Do they produce any deleterious fumes if used in close places, or are they in any other way dangerous, in store or in use?—4. Are they affected by damp or other climatic changes?

I have had a rather considerable experience with the ordinary Abel and Bra'n's electric fuses, which I find more or less objectionable for the following reasons:—1. Their very frequent irregularity of action.—2. Their having to be used by a foreman or other skilled workman.—3. That they necessitate the employment of an electric exploder of some form or other, which is liable to derangement, which often happens in districts where the necessary repairs cannot be properly effected; and, lastly, their excessive cost in small workings, say, for example, in the firing of from six to 12 ordinary blasting charges.

Any practical information which can be given by any of your readers on the subject of Messrs. Bickford, Smith's new system will much oblige.—*Paris, June* 4. C.

WEST POLBREEN MINE COMPANY.

SIR,—With reference to the report of the four-monthly meeting of this company, and other remarks [communicated by Mr. J. B. Reynolds, and printed as a quotation to indicate that they were not editorial. ED. *M. J.*] which appeared in last week's *Mining Journal*, I have to state in reply that the shareholders would observe from the slip accompanying my circular that the meeting I referred to was one to be called specially for the purpose stated therein, and not the ordinary meeting that has just taken place, so that my not being present at this ordinary meeting must not be held as in any way an abandonment of the objects I have in view. My representative was no doubt present at the meeting, but his instructions were simply to watch the proceedings on my behalf, and as particulars were carefully avoided by Mr. J. B. Reynolds, and none of the facts stated by me denied, except in the vaguest terms, he did not consider it necessary to address the meeting in support of my circular.

Mr. J. B. Reynolds stated that he was not, and never had been, the Chairman of the company, but your readers will easily observe that this is a mere quibble. Mr. Reynolds, so far as I am aware, has presided at every meeting of the company since its formation; and, as the Chairmanship of a company is always during the pleasure of the shareholders, it is of little consequence whether he sits for a year or a day, except for equivocation. Mr. Reynolds, therefore, has actually been the Chairman of the company up to this date, and at last meeting he had the extraordinary satisfaction of occupying the chair on the motion of Mr. Learoyd, the company's own solicitor, in place of, on the motion of one of the shareholders.

I have a letter, however, from a gentleman who was at the meeting in which he states there were only some twelve persons present altogether, whom he imagined were either officials of the company or personal friends of Mr. J. B. Reynolds, which perhaps accounts for the necessity of such an unusual proceeding. Mr. Reynolds is reported to have stated at the meeting that had the facts been otherwise he would have been very glad to have undertaken the responsibility of the Chairmanship of the company as involved in its past history. If this means that had he still owned 3000 shares, as at first, in place of only three as at Feb. 20 last, I can quite understand him.

The most alarming circumstances in connection with this mine (and there are several) is the indisputable fact of Mr. Reynolds having sold 2997 of his 3000 shares. If the mine is such a good speculation as he would have the shareholders believe, why has he not retained his shares? Let Mr. J. B. Reynolds answer this, and deny the other facts, one by one, in the columns of the *Mining Journal*, to the satisfaction of your readers. It is all very well to indulge in vague generalities; but let him tackle them separately and openly, and I have no fear of the result. With reference to Mr. J. B. Reynolds' remark that "my circular was calculated to injure two young men of honour and integrity (the secretary and auditor)," I venture to maintain that my circular is not capable of any such construction. The secretary and auditor may both be very good clerks, and it is no disparagement to the honour and integrity of either of them to say that mere clerks in Mr. J. B. Reynolds' office are unsuitable persons for the offices they hold in a company, the business of which is conducted in Mr. J. B. Reynolds' own office and in the other circumstances stated.

The reckless remarks reported to have been made by Mr. N. Learoyd do not call for any further reply than a simple reference to my letter in last week's Journal (where your readers will find a conclusive reply), with the exception of the base insinuation "that he knew that it was not the first and only company that I had experimented upon," which is emphatically untrue, and I challenge Mr. Learoyd either to make good his assertion or apologise, and I have written him to that effect. The gratuitous remarks reported to have been made by Mr. James, "that brokers on the London market, &c., made the proviso to bar my shares," does not trouble me, but if this gentleman whose language savours so much of the "Turf," is the authorised mouthpiece of the London dealers, I shall leave it to the judgment of your readers and all honest men to form their own conclusions.—*Glasgow, June* 5. JAMES MCMEEKEN.

ANGLESEA LIMESTONE QUARRIES.

SIR,—The very interesting letter in last week's *Mining Journal* does not in any way exaggerate the present outlook of the abovementioned quarries, seeing that in the immediate future they will (in addition to the requirements of the Manchester Ship Canal) also be called upon to furnish the stone for the construction of the proposed new docks and works at Holyhead by the London and North-Western Railway Company, as well as for the new docks, river embankment and quay-walls, along the Ribble at Preston, for the construction of which some hundreds of thousands of tons of stone will be required. The quantity of stone for the 12 miles of training-walls for the protection of the river Mersey required by the Manchester Ship Canal, entirely apart from what will subsequently be wanted for the canal itself, and the immense locks and numerous drawbridges, abutments with which it is to be furnished, assuming the facing to consist of 18 in. only of Anglesea stone, will be upwards of 147,000 tons. Nearly all the existing docks and large works at Garston, Runcorn, River Weaver, and Canal Company's and other large works on the banks and leading away from the upper part the Mersey are constructed of Anglesea stone and marble.

The producing capacity of some of the great quarries of Anglesea such as the Great Dinorbin, the Consolidated, and the Meyrick Quarries, are pretty large, as will be gathered from the following remarks regarding the latter quarries by Mr. T. F. Evans, J.P., late H.M. Inspector of Mines and Quarries. He says:—"As regards the producing capacities of the quarries, I think I may safely say they are unlimited, and I consider the computed immediate return of 200 tons a day as being well within the mark, if proper appliances are used."

The producing capacity of the Great Dinorbin Quarries when fully equiped with the necessary rolling stock, plant, and lifting appliances will be even still greater. These quarries, which belong to Capt. Mills, of Westminster, have been inspected and reported upon by several of the highest authorities in the kingdom on quarry matters, the most recent being that of Messrs. P. and J. Higson, of Manchester, all of whom speak of this property as of most exceptional value; and from the extraordinary combination of natural working facilities it embraces for the development upon an unusually extensive scale of the entire quarry face—about 300 ft. in height—by a series of open galleries like those at the Penrhyn Slate Quarry. Its producing powers will ultimately surpass greatly that of any building-stone quarry in the United Kingdom, and bring the cost of production per ton to an incredible minimum.

I am pleased to see that the proprietors of the famous Meyrick Quarries are sensible of the importance of the employment of cutting, shaping, and surfacing machinery. Had this course been adopted 30 years ago many thousands of pounds would have been saved to the pockets of the owners and an enormous waste of most valuable stone avoided. In consequence of the exceptionally large blocks (up to 100 or more tons), for the produce of which this extensive quarry is so famous, cutting machinery will be employed here with the greatest possible gain and advantage, as the blocks will thus be prepared by the sand-saws to any required dimensions ready for use with scarcely any additional cost the saving in material and scabbling alone will more than meet the cost of sawing. This stone, being almost pure carbonate of lime, is free from all gritty matter, thus affording every facility for its mechanical manipulation. I find upon referring to Lewis's Topographical Dictionary of North Wales, published in 1833, that referring to these (Meyrick Quarries) it says:—Black, grey, and variegated marble are found within its limits, the last of which is of very superior quality, and from the variety and brilliancy of its colours and the high degree of polish of which it is susceptible, is in very great estimation, and is sent in considerable quantities to various parts of Great Britain.

Owing to the depressed state of the copper market, the celebrated Parys Mountain Mines are almost at a standstill, therefore any new source of employment in the island causes no small amount of animation in the minds of the labouring class, both in Anglesea and the adjoining county of Carnarvon. The employment given by Captain Mills at his Dinorbin Quarries, has proved a great boon to many during the past winter, and now that the Consolidated Quarries have commenced operations under the superintendence of Mr. Wilkins, it is confidently expected that a degree of prosperity will prevail in the future for the labouring population of the several Anglesea quarry districts not afforded to them for some years past.

Rock Ferry, June 4. MONA'S ISLE.

[For remainder of Original Correspondence see this day's Journal.

FOREIGN MINING AND METALLURGY.

Quotations have scarcely varied in the French Iron Trade, although the demand has become more active. Some improvement might be noted in the situation, but for the inveterate competition which merchants carry on against each other. The Paris market has been firmer, principally in consequence of a somewhat pressing provincial demand, provincial firms obtaining more prompt deliveries from Parisian warehouses than from the forges. The production of refining pig in France last year amounted to 1,616,903 tons, as compared with 1,597,749 tons in 1882. The production of casting pig in France last year was 450,484 tons, as compared with 441,318 tons in 1882. The production of iron in France last year was 918,068 tons, as compared with 1,073,021 tons in 1882. The production of last year was made up as follows:—Rails, 19,178 tons; merchants' iron, 800,380 tons; and plates, 145,510 tons. It will be seen that the production fell off last year 104,954 tons, or 9·70 per cent. This rather marked decline in the production of iron was compensated for to some extent by an increase in the production of steel, the French steelworks having last year turned out 509,045 tons, as compared with 458,238 tons in 1882, showing an increase of 50,807 tons last year. The 509,045 tons of steel produced in France last year were made up as follows:—Rails, 381,178 tons; merchants' steel, 94,535 tons; and plates, 33,332 tons. There was an appreciable increase in the production of steel rails in France last year in consequence of the activity impressed upon the work of railway construction. There was also an increase in the production of steel plates last year in consequence of considerable shipbuilding operations on Government account.

No serious improvement is observable in the Belgian Iron Trade. Even indispensable transactions have been carried through in a sluggish, hesitating fashion. The rolling mills appear to be closing one after another as their last remaining orders are being worked out. Plates alone have been in tolerably active demand. English casting pig has made 2*l.* 3s. 8d. per ton. No. 1 iron has been quoted at 4*l.* 12s. per ton, No. 2 at 4*l.* 18s. per ton, and No. 3 at 5*l.* 4s. per ton. Girders have made 4*l.* 16s. to 5*l.* per ton. No. 2 plates have brought 6*l.* 4s. per ton; No. 3 ditto, 7*l.* per ton; and No. 4 ditto, 10*l.* 4s. per ton. Business in pig has remained in a languishing state in the Rhenish provinces and in Westphalia; prices have, however, remained at their former level, which for the rest is not very remunerative for the works. There has been rather an active demand for rolled products, and the more important works have received during the last few weeks orders to a sufficient extent to enable them to maintain their production at its ordinary level. This remark applies especially to the works turning out bars and plates. The Administrations of some of the principal German lines are about to give out some large orders for steel rails; these orders are expected to be divided among Rhenish and Westphalian works; they will comprise about 31,000 tons of rails.

In the Couchant de Mons—a district in which the Coal Trade showed recently a certain amount of activity—business has been rather falling off of late. There has, however, been more enquiry for industrial coal. The coal trade has ruled quiet at Liége, but prices have been pretty well supported. Upon the Paris coal market business has still maintained a certain activity, especially for boat cargoes. The movement of coal from the collieries of the Rhine and Westphalia has been satisfactory of late, and prices have been maintained with a certain firmness. The number of coal and coke trucks which passed over the Berg and Mark Railway in the first half of May was 3328, as compared with 3315 in the corresponding period of 1883. Round Brühl, in the neighbourhood of Cologne, there have been from time immemorial some small workings of lignite. Rhenish and Westphalian capitalists have resolved to extend these workings, which have hitherto been confined to the surface only. Soundings have been made with this object. The results attained thus far in connection with the new works undertaken are said to have been highly satisfactory. The Belle-et-Bonne Colliery Company (Belgium) will pay June 20 a dividend for the second half of 1883 at the rate of 3s. 3d. per share.

CANADIAN MINING PROGRESS.—Mr. Obalski, mining engineer for the province of Quebec, has, says the Canadian Correspondent of the Liverpool Journal of Commerce, recommended an investigation at various points on the north shore of the St. Lawrence, from Quebec to Ottawa, in order to ascertain the origin of certain gases, believed by scientific men to be indicative of petroleum deposits. He says a company with some $10,000 to dispose of would surely meet with success. Application has been made to the Dominion Government by a company of Canadian, English, and American capitalists for the right to work a sub-aqueous gold mine on the North Saskatchewan river.

WORKING-CLASS PROGRESS IN NEW SOUTH WALES.—According to the Statistical Registar of New South Wales, the wages of the labouring classes in that colony appear to have been steadily maintained during the last ten years, with a tendency to rise in the case of farm labourers, persons engaged in agriculture, and domestic servants. At the same time there has been a marked decrease in the cost of clothing, which is however counterbalanced to some extent by the increased cost of many kinds of provisions, which will become cheaper as railway communication with the agricultural districts becomes increased.

ON PORTABLE RAILWAYS.—No. II.

BY PAUL DECAUVILLE,* OF PETIT-BOURG (SEINE AND OISE), FRANCE.

The members of the Institution who recently visited the new Port of Antwerp will recollect seeing there the portable railway which Messrs. Couvreux and Hersent had in use; and as the works at the Port of Antwerp gave rise to the idea of this paper, it will be well to begin with a description of this style of contractors' plant. The earth in such works may be shifted by hand, horse-power, or locomotive. For small works the railway of 16 in. gauge, with the 9 lbs. rails, is commonly used, and the trucks carry double-equilibrium tipping-boxes, containing 9 to 11 cubic ft. These wagons having tipping-boxes without any mechanical appliances are very serviceable; the box, having neither door nor hinge, is not liable to need repairs, and it keeps perfectly in equilibrium upon the worst roads. To tip it up to the right or left, it must simply be pushed from the opposite side, and the contents are at once emptied clean out. In order that the bodies of the wagons may not touch at the top, when several are coupled together, each end of the wagon is furnished with a buffer, composed of a flat iron bar cranked, and provided with a hanging hook. Plant of this description is now being used in an important English undertaking at the port of Newhaven, where it is employed not only on the earthworks, but also for transporting the concrete manufactured with Mr. Carey's special concrete machine.

These little wagons, of from 9 to 11 cubic ft. capacity, run along with the greatest ease; and a lad could propel one of them with its load for 300 yards at a cost of 3d per cubic yard. In earthworks the saving over the wheelbarrow is 80 per cent., for the cost of wagons propelled by hand comes to 1d. per cubic yard carried 100 yards, while to go this distance with a barrow costs 5d. A horse draws without difficulty, walking by the side of the line, a train of from eight to ten trucks on the level, or five on an incline of 7 per cent. (1 in 14). One mile of this railway, of 16 in. gauge and 9 lbs. steel rails, with 16 wagons, each having double-equilibrium tipping-box containing 11 cubic ft., and all accessories, represents a weight of 20 tons—a very light weight, if it is considered that all the materials are entirely of metal. Its net cost price per mile is 450*l*., the wagons included.

Large contracts for earthwork with horse haulage are carried on to the greatest advantage with the railway of 20 in. gauge and 14 lbs. rails. The length of 16 ft. 5 in. of this railway weighs 170 lbs.; and so can be carried easily by two men, one at each end. The wagons most in use for these works are those with double-equilibrium tipping-boxes, holding 18 cubic ft. These are now being employed in one of the greatest undertakings of the present time—the cutting of the Panama Canal, where there are in use upwards of 2700 such wagons and more than 35 miles of track. A mile of this railway of 20 in. gauge with 14 lbs. rails, together with 16 wagons of 18 cubic ft. capacity, with appurtenances, costs about 660*l*., and represents a total weight of 33 tons. This description of material is used for all contracts exceeding 20,000 cubic yards.

A very curious and interesting use of the narrow gauge line, and the wagons with double-equilibrium tipping-box, was made by the Société des Chemins de fer Sous-Marins on the proposed tunnel between France and England. The boxes are perfectly balanced, and are most easily emptied. The wagons run on two lines, the one being for the loaded trains, and the other for the empty trains. The engineers and inspectors, in the discharge of their duties, make use of the Lilliputian carriages already mentioned. The feet of the travellers go between the wheels, and are nearly on a level with the rails; nevertheless they are tolerably comfortable. They are certainly the smallest carriages for passengers that have ever been built.

One of the most important uses to which a narrow gauge line can be put is that of a military railway. The Dutch, Russian, and French Governments have tried it for the transport of provisions, of war material, and of the wounded in their recent campaigns. In Sumatra, in Turkestan, and in Tunis, these military railroads have excited much interest, and have so fully established their value that a short description will here suffice. The campaign of the Russians against the Turcomans presented two great difficulties, in the crossing of districts where water was extremely scarce or failed entirely, and in the victualling of the expeditionary forces. The latter object was completely effected by means of 67 miles of railway, of 20 in. gauge and 14 lbs. steel rails, with 500 carriages for food, water, and passengers. The rails being simply laid on the sand, small locomotives could not be used, and had to be replaced by Kirghiz horses, which drew with ease from 1800 to 2200 lbs. weight for 25 miles per day.

In the Tunisian war this railroad of 20 in. gauge with 14 lbs. rails was replaced by that of 2 ft. gauge, with 14 lbs. and 19 lbs. rails. There were quite as great difficulties as in the Turcoman campaign, and the country to be crossed was entirely unknown. The observations made before the war spoke of a flat and sandy country. In reality a more uneven country could not be imagined; alternating slopes of about 1 in 10 continually succeeded each other, and before reaching Kairouan 7½ miles of swamp had to be crossed. Nevertheless the horses harnessed to the railway carriages did on an average twelve to seventeen times the work of those working ordinary carriages. In this campaign also, on account of the steep ascents, the use of locomotives had to be given up. The track served for the conveyance not only of victuals, war material, and cannon, but also of the wounded; and a large number of the survivors owe their lives to this railway, which supplied the means of their speedy removal, and without great sufferings, from the temporary hospitals, and of carrying them to places where more care could be bestowed upon them.

For the transport of cannon the French military engineers have adopted small trucks. A complete equipage, capable of carrying guns weighing from 3 to 9 tons, is composed of trucks with two or three axles, each being fitted with a pivot support, by means of which it is rendered possible to turn the trucks, carrying the heaviest pieces of ordnance, on turntables, and to push them forwards, without their going off the rails at the curves. The trucks which have been adopted for the service of the new forts in Paris are drawn by six men, three at each end of the gun; and these are capable of moving with the greatest ease guns weighing 9 tons.

The narrow gauge railway was tested during the war in Tunis more thoroughly than in any preceding campaign; and the military authorities decided, after peace had been restored in that country, to maintain the narrow gauge railways permanently; this is a satisfactory proof of their having rendered good service. The line from Sousse to Kairouan is still open for regular traffic. In January, 1883, an express was established, which leaves Sousse every morning and arrives at Kairouan—a distance of 40 miles—in five hours, by means of regularly organised relays. The number of carriages and trucks, for the transport of passengers and goods, is 118. The success thus attained by the narrow gauge line goes far to prove how unfounded is the opinion that light railways will never suffice for continuous traffic. That opinion is based on certain cases in the colonies, where it was thought fit to adopt a light rail weighing about 18 to 27 lbs. per yard, but keeping to the old normal gauge. It is nevertheless evident that it is impossible to construct cheap railways on the normal gauge system, as the maintenance of such would-be light railways is far more costly in proportion than that of standard railways.

The narrow gauge is altogether in its right place in countries where, as notably in the case of the colonies, the traffic is not sufficient to warrant capitalising the expense of constructing a normal gauge railway. Very recently the Eastern Railway Company of the Province of Buenos Ayres have adopted the narrow gauge for connecting two of their stations, the gauge being 24 in. and the weight of the rails 19 lbs. per yard. They have constructed altogether six miles of narrow gauge road, with a rolling stock of 30 passenger carriages and goods trucks and two engines, at a net cost price of 7500*l*., engines included. This line works as regularly as the main line with which it is connected. The composite carriages in use leave nothing to be desired with regard to their appearance and the comfort they offer. Third-class carriages covered and open, and covered goods wagons, are also employed. All these carriages are constructed according to the model of those on the Festiniog Railway. The engines weigh 4 tons, and run at 12½ miles per hour for express trains with a live load of 16 tons; while for goods trains carrying 35 tons the rate is 7½ miles per hour.

* Paper read at the recent meeting of the Institution of Mechanical Engineers.

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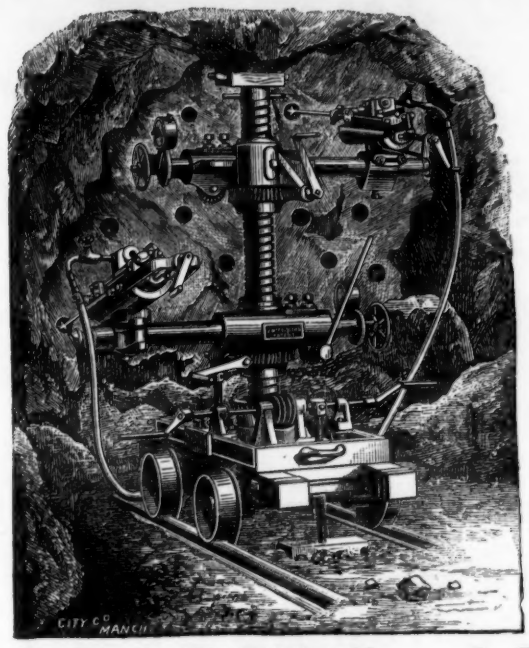

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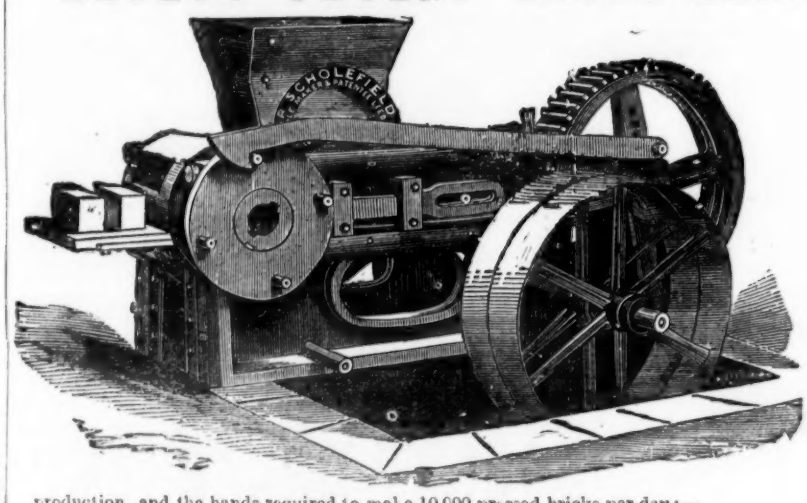

R. S. begs to call the attention of all Colliery Owners in particular to his PATENT SEMI-DRY BRICK MACHINE, and the economical method of making bricks by his patent machinery from the refuse that is taken from the pits during the process of coal-getting, which instead of storing at the pit's mouth (and making acres of valuable land useless) is at once made into bricks at a very small cost, by R. S.'s Patent Brick-making Machinery. If the material is got from the pit hill, The following is about the cost of production, and the hands required to make 10,000 pressed bricks per day:—

2 men digging, each 4s. per day	£0 8 6
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Total cost of making 10,000 pressed bricks	£1 5 0, or 2s. 5d. per 1000.

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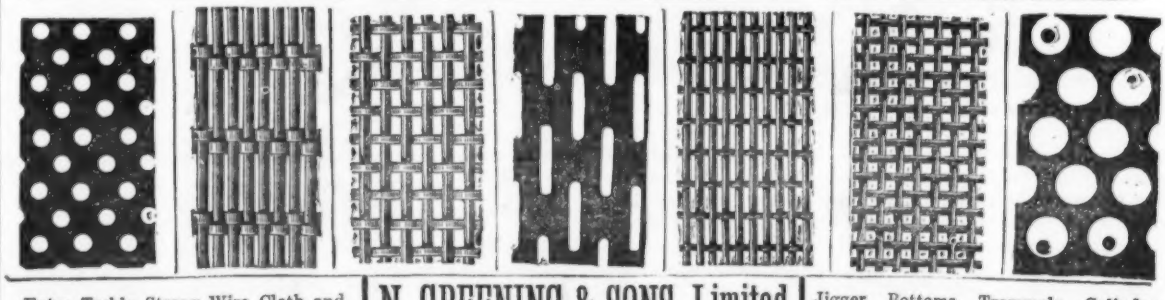

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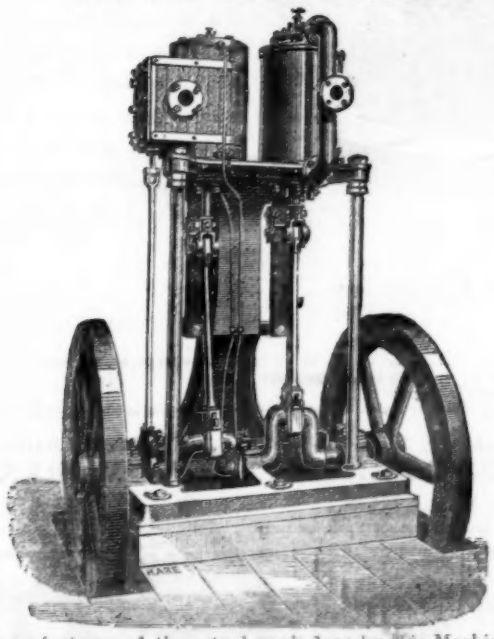

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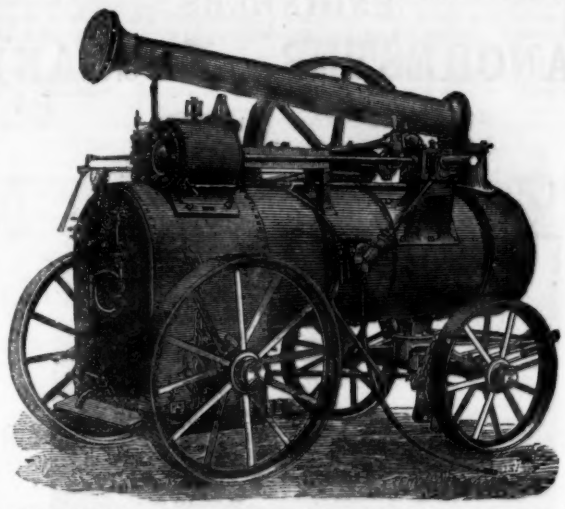

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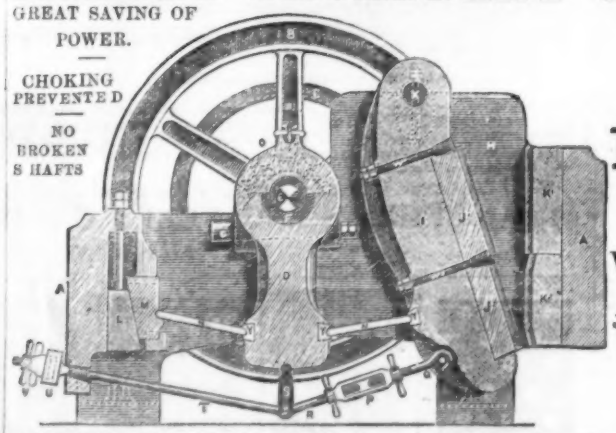

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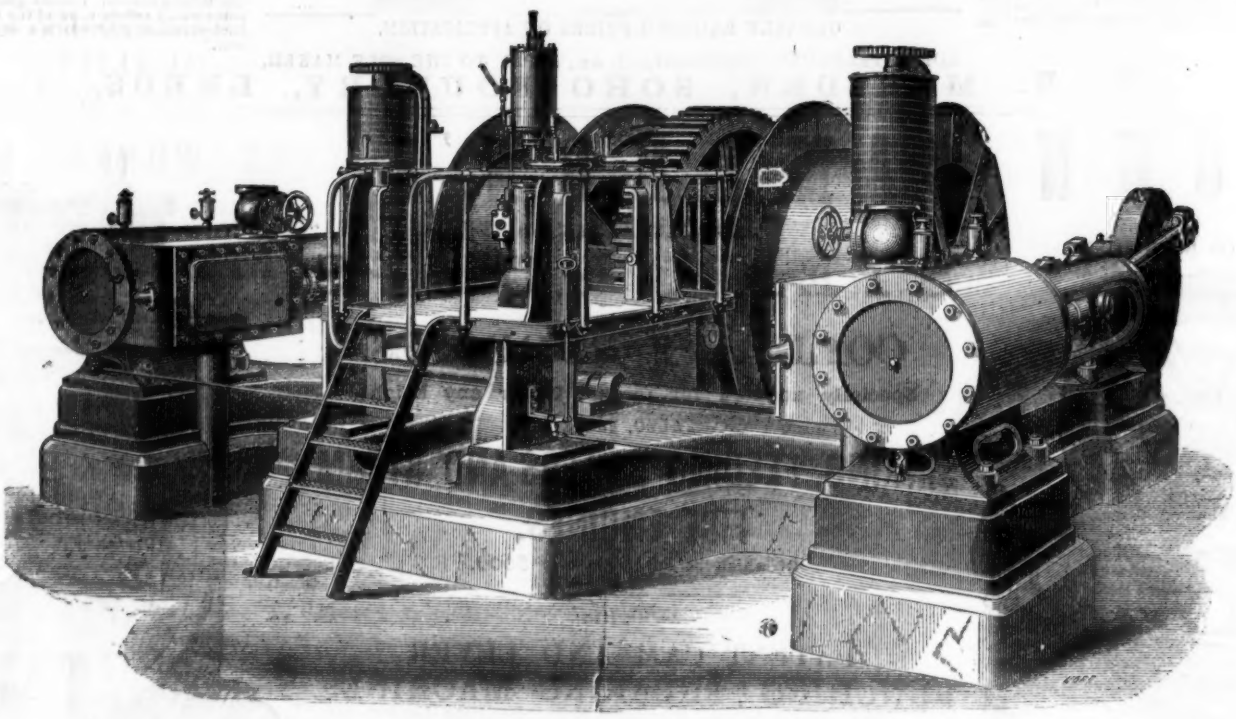

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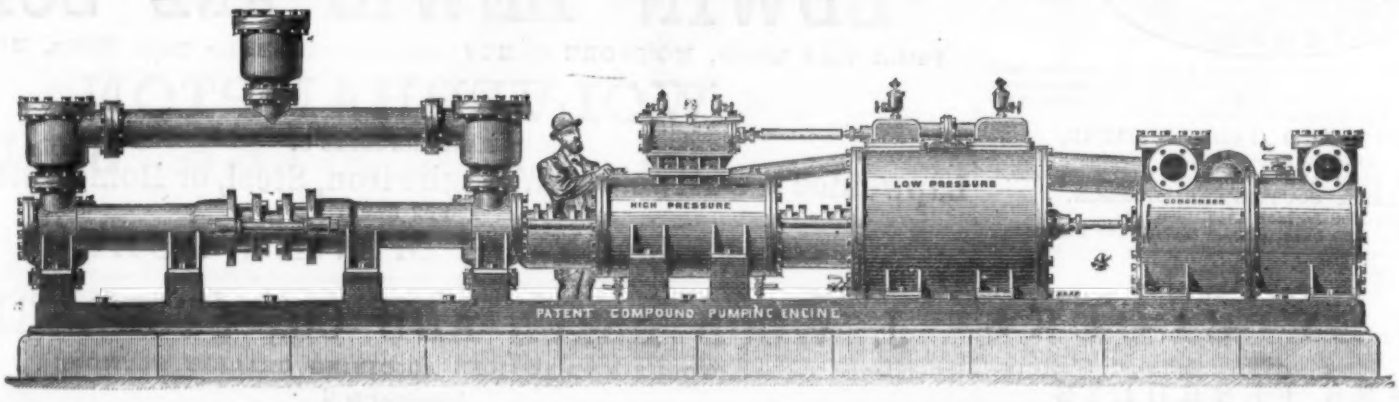

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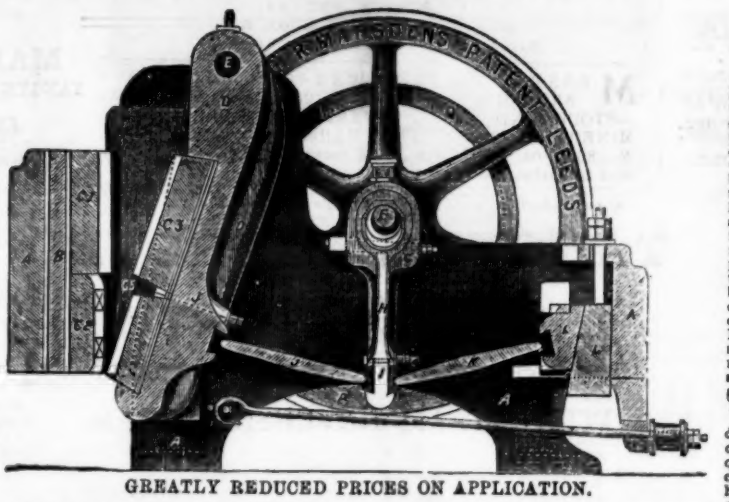

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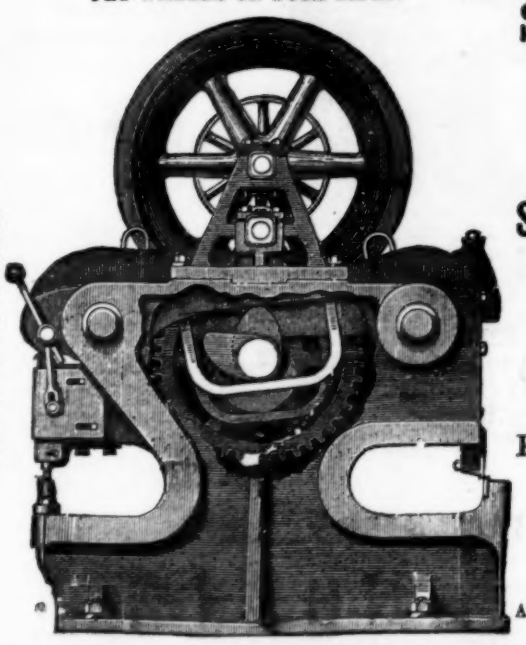

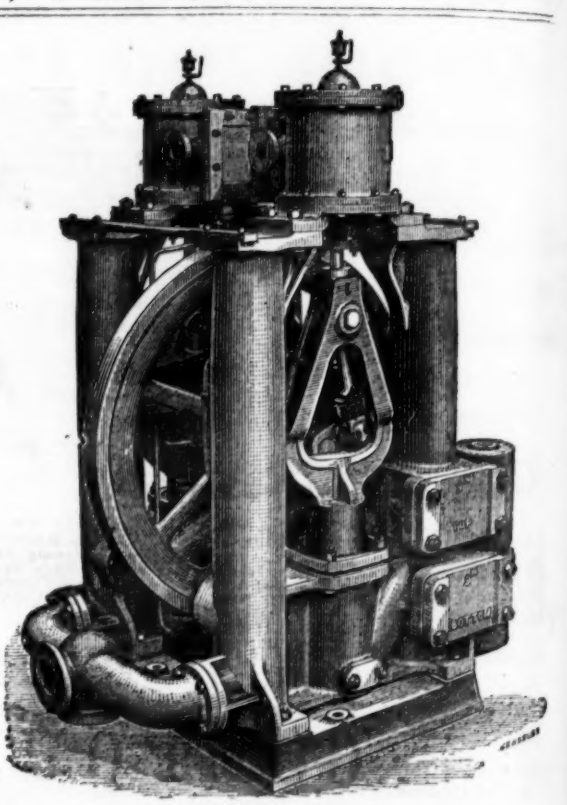

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